THE IRON TRADE REVIEW

VOLUME XXXV CLEVELAND, O., JUNE 26, 1902 NUMBER 26

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The iron trade has added considerable new tonnage to its bookings for 1903 in the past week, and consumers have found that pig iron, steel billets and the heavier forms of finished material are increasingly difficult to get for this year's delivery. Steel rail contracts already made for next year amount to about 700,000 tons and it is estimated that 1902 tonnage on the books that cannot be rolled this year will increase this amount to 1,000,000 tons. The railroads give no sign of being less liberal buyers in the coming year than in the year ending with the first half of 1902. Locomotive works are sold up well into 1903 and have even taken orders for 1904. In car construction also there is no indication that the pace will be slackened in the year just ahead. Agricultural works in many instances will be busy through most of the summer, except for the time required by necessary repairs, and specifications for a considerable tonnage of steel bars will come in just that much earlier than usual. In this way some of the easing up on converting and open-hearth plants expected to result from the slowing down in the wire trade and to some extent in sheets, will be counteracted. A number of rolling mills in the Central West that will be closed down for the first two weeks in July have been very active this month on specifications that came in in anticipation of the shut-down. In the East the settlement of some of the puddlers' and finishers' strikes has added to the production of bars and abolished premiums that were being paid for early deliveries. The structural and plate mills are steadily booking orders for 1903. Building demand seems not to be checked by present prices, even though some producers of structural shapes continue to get a good advance over the Pittsburg basis of 1.60c. Concerning the proposal for the shutting down of wire and wire nail plants for a part of July, there is no concert in the matter. Some of the plants of the larger producers are undergoing repairs, and in the case of smaller interests the present prices for billets and rods are operating to limit their production. Further importations of steel are in prospect and prices for foreign billets are rather lower—$30 at seaboard and $32 at Pittsburg and Chicago, import steel for the latter point coming via New Orleans. The pig iron market shows in some localities continued initerest in 1903 contracts for foundry iron. The agricultural interests are believed to be fairly well covered for the first half, and some jobbing foundries that have sold castings for delivery in the next 12 months have supplied themselves. The bulk of the foundry trade considers that prices will not be higher and is not in a hurry to contract. Meantime prices for spot delivery advance. Lehigh Valley furnaces continue to bank for lack of fuel. In Southern Ohio the furnaces banked for lack of New River and Pocahontas coke have not secured enough to start and at Columbus two shutdowns seem inevitable. A number of foundries are on the point of closing down. We hear of sales of Southern No. 2 foundry iron for 1903 delivery at $17 at furnace. Delivered sales are not now made from the South, in view of the agitation of an advance in freights. From Central Western furnaces sales for next year are made at from $20 to $21 for No. 2 foundry.

PITTSBURG.

OFFICE OF *The Iron Trade Review*, 429 PARK BUILDING, June 25.

In certain quarters concern is being felt because the iron and steel market is going to an abnormal level, the belief being expressed by some that a slump will certainly follow akin to that of two years ago. Others are of the opinion that the high point has about been reached and that prices will remain about where they are at present through the remainder of the present year at least. It is pointed out that in some lines, notably the sheet and wire trade, there is an easing off and with the reduced consumption of steel in these the pressure will be relieved on other lines. Not that there is not a good volume of business being offered in these lines but the capacity of the mills in both cases is considerably above the country's requirements and certain of the mills will therefore be compelled to close down until a still better demand sets in and that is not expected before late in August or early in September.

In foundry iron prices have been forced slightly upward during the week, but the sales have been limited to small lots almost entirely, and where extremely high prices were paid the urgency of the shipment figured almost entirely in the premium asked. In Bessemer iron, on the other hand, there is no tendency to force prices upward for the reason that there will be no large buying for some time to come, and the large steel producers who figured on covering their requirements through the first half of next year are almost convinced that the prices quoted today for that delivery will not have advanced during the next three or four months.

The closing of business on plates, rails, bars and structural shapes at present base prices is doing much to hold the market down, and while many of the large outside steel interests are refusing much business for next year's delivery, for the reason that they believe they will be able to secure premiums on their tonnage after the United States Steel Corporation has filled up, they are no doubt convinced that another year of prosperity is in store for the iron and steel trade.

Up to the present time contracts for nearly 700,000 tons of rails have been closed for next year's delivery by the rail mills of the country, the United States Steel Corporation having about three-fourths of this tonnage on its books. The steel corporation, according to a conservative estimate, now has booked fully 1,500,000 tons of material for next year's delivery, and adding to this an immense tonnage that will be carried over in structural shapes and rails already has nearly one-fourth of its next year's output taken care of. One large steel interest, that is extremely conservative in booking business for next year's delivery, has already 100,000 tons on its books and the tonnage closed for 1903 by other outside interests will no doubt bring this total up to 500,000 tons. Thus it can be seen that a good percentage of next year's business is already closed at present base prices and this will no doubt be a potent factor in holding prices at a level except in cases where short time deliveries are insisted upon.

In the wire trade, the plan to shut down the mills for a certain period during the summer months to limit production will not have to be carried out, for the reason that many of the smaller mills, dependent upon the open market for their supply of steel, have shut down or will shut down on account of the unprofitableness of continuing operations with billets and rods at the present prices. On the other hand several

of the largest agricultural implement manufacturers in the country have decided to operate their plants throughout the summer months to catch up on their orders, although several of the smaller ones will close down for brief periods. This will result in much heavier specifications for bars and kindred lines which the manufacturers did not look for during the months of August and September.

PIG IRON.—Sales of pig iron during the week have been limited to small lots entirely, although there was one round lot of foundry iron sold for delivery through the first half of next year at a good price. Small lots of No. 2 foundry for this year have been sold during the week at $22.50 to $22.75 per ton while one lot of No. 2 for delivery next year brought $21.50, delivered. Sales of Bessemer iron have been limited to small lots entirely at prices ranging from $21.50 to $22 at the furnace. The price asked the United States Steel Corporation for delivery next year by the Valley furnaces was $20.50 at the furnace, a price at which the corporation officials believe they can procure the iron several months in the future. According to present estimates there remains fully 100,000 tons of Bessemer iron unbooked through the last quarter of this year and the first quarter of next year. We revise quotations as follows:

Bessemer, Valley	$21 00 to 22 00
Bessemer, Pittsburg	21 75 to 22 75
No. 1 Foundry	22 50 to 23 25
No. 2 Foundry	22 25 to 23 00
No. 3 Foundry	21 25 to 21 75
Gray Forge, Pittsburg	20 50 to 21 00
Chilled Basic, Valley	20 25 to 21 00
Chilled Basic, Pittsburg	21 50 to 21 75

STEEL.—The domestic steel market has weakened somewhat owing to the refusal of consumers to pay the almost prohibitive prices asked by the steel manufacturers. We note the sale of 4x4 Bessemer billets at $34.25 for delivery through the last quarter of this year while steel for prompt delivery is held at $34.75 to $35 per ton. Several thousand ton lots of German billets have been contracted for during the week at $32.50 and the buying of foreign steel will continue as long as the local market remains as high as it is at present. Bessemer rods are held at $36 to $36.50, with practically no buying reported.

FERRO-MANGANESE.—During the week the English manufacturers of ferro-manganese have advanced the price to $52.50 delivered anywhere in the United States, while the German producers are holding their product at $52.25 to $52.50. No domestic manganese is being placed on the market at the present time.

RAILS AND TRACK MATERIAL.—The total tonnage of rails closed by the mills of the country up to the present time for delivery next year amounts to nearly 700,000 tons. This new business together with the tonnage that will be carried over brings the total already on the books for next year's rolling up to more than 1,000,000 tons. Quotations are as follows: Standard sections, 50 pounds and over, in lots of 200 tons and over, $28; car lots and less than 200 tons, $30; less than car lots, $32; light rails, 8 pounds, $45; 12 pounds, $42; 16 pounds, $39; 20 pounds, $37; 25 to 40 pounds, $34 to $36. Track material: Spikes, 2c to 2.05c; track bolts, square heads, 2.50c; hexagon heads, 2.65c; fish plates, 1.60c.

MUCK BAR.—Muck iron continues high in price and we note several 200-ton sales at $36.50 per ton for delivery within the next two months.

SKELP.—Both iron and steel skelp continues high in price, the former on account of the high price of muck bar and the latter on account of the high price of steel. Grooved and sheared skelp is held at 2.25c to 2.40c, while steel skelp is quoted nominally at 2.25c.

SPELTER.—The spelter market continues to rule high on account of the strike at the mines and prime Western grades are held at 4.75c to 4.80c, Pittsburg.

PLATES.—A large volume of business is being closed in plates both for delivery this year and next. While the United States Steel Corporation mills are taking business at 1.60c, and are unable to make deliveries this year, the outside mills are securing from 1.85c to 2c for delivery during the next six months. Agreed quotations are as follows: Tank plates, ¼-inch thick and up to 100 inches in width, 1.60c at mill, Pittsburg; flange and boiler steel, 1.70c; marine, ordinary firebox, A. B. M. A. specifications, 1.80c; still bottom steel, 1.80c; locomotive firebox, not less than 2.10c, and it ranges in price to 3c. Plate more than 100 inches wide, 5c extra 100 pounds. Plates 3-16 of an inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra. These quotations are based on carload lots, with 5 cents extra a hundred pounds for less than carload lots. Terms, net cash, in 30 days.

BARS.—Specifications on both iron and steel bars on contracts closed some time ago which run to July 1, 1903, are already beginning to come in, and owing to the decision of several of the large agricultural implement manufacturers to operate their plants during the months of July and August the mills will not be able to catch up on their orders as they expected would be the case. Premiums of from $2 to $3 are asked on Bessemer bars for early shipment, while iron bars are not being shaded. For future delivery quotations are as follows: Bessemer steel bars, 1.60c; open-hearth, 1.70c; plow beams and cultivator beams, 1.60c, net; channels, angles, zees and tees, Bessemer under 3 inches, 1.70c; over 3 inches, 1.80c; bar iron, 1.80c to 1.90c, Pittsburg, with full freight added to point of delivery. Hoops and bands are quoted at 1.90c, full extras, in 250-ton lots and over, and 2c in less than 250-ton lots; refined iron bars, 2.25c and upwards.

PIPES AND TUBES.—There is an extreme scarcity of merchant pipe and boiler tubing for prompt delivery, and independent manufacturers having small stocks on hand are asking premiums for prompt shipment. The Oil Well Supply Co. closed several large contracts during the week which call for the delivery of fully 3,000 tons of pipe within the next six months. Qotations to jobbers in carload lots, with freight added to destination, are as follows:

MERCHANT PIPE.

	Black. Per cent.	Galv. Per cent
⅛ to ⅜ and 11 to 12 inches	60	48
½ to 12 inches	67	55

Discounts to consumers in carload lots, Pittsburg, are as follows:

BOILER TUBES.

Steel.

	Per cent.
1 to 1¼ inches	42½
2¼ to 5 inches	61
1½ to 2¼ and 6 to 13 inches	55½

Iron.

	Per cent.
1 to 1¼ inches	39
2¼ to 5 inches	48
1½ to 2¼ and 6 to 13 inches	38

CASING.

	S. and S. Per cent.
2 to 3 inches	58
3¼ to 4 inches	60
4¼ to 12½ inches	63

SHEETS.—While the volume of business that is being offered in sheets is very large, it is not sufficient to keep all the independent and combination mills in operation, and it is believed that additional mills will be closed down during the next few months until the volume of business again increases. Concessions are now being made by some of the independents to secure business, although the American Sheet Steel Co. is holding prices on the basis established nearly a year ago. We make the following quotations in carload lots to consumers: Nos. 10 and 12, 2.40c to 2.50c; 14 and 15, 2.50c to 2.60c; 16, 2.60c; 18 and 20, 2.70c to 2.80c; 22 and 24, 2.80c to 2.90c; 26, 2.90c to 3c; 27, 3c to 3.10c; 28, 3.10c to 3.20c; 29, 3.25c to 3.35c; 30, 3.35c to 3.45c. Galvanized sheets, in carload lots to consumers, are quoted at 3.05c for Nos. 10 and 11, 3.45c for Nos. 18 to 21, 4.20c for No. 27, and 4.50c for No. 28. Galvanized sheets, mill shipments in carload lots to consumers are as follows: Nos. 10 and 11, 3.05c; Nos. 12 to 14, 3.15c; Nos. 15 to 17, 3.25c; Nos. 18 to 21, 3.45c; Nos. 22 to 24, 3.75c; Nos. 25 and 26, 4c; No. 27, 4.25c; No. 28, 4.50c.

STRUCTURAL MATERIAL.—Little business is being booked in structural shapes for delivery this year, the bulk of the business being closed for delivery in 1903. All of the mills are behind on deliveries of light angles, the Carnegie Steel Co. being compelled to make shipments from Chester, Pa., to fill the monthly requirements of the Pressed Steel Car Co. Small lots of structural shapes for early deliveries command 2.50c to 3c, depending upon the size of the order while only on business for next year's deliveries are the following prices quoted: Beams and channels, 3 to 15 inches, 1.60c; 18 to 24 inches, 1.70c; tees, 1.65c; zees, 1.60c; angles from 3 to 6 inches, 1.60c; universal mill plates, 1.60c.

WIRE AND WIRE NAILS.—There will be no general shut down of the wire nail and wire plants of the country during the month of July for the reason that many of the smaller mills have been compelled to close on account of the present high prices of billets and rods, thus materially cutting down the production. We make the following quotations: Wire nails in carload lots, $2.05 per keg; smaller lots, $2.10 and $2.15; plain wire, $2 in carload lots and $2.10 in less than carload lots to retailers; galvanized wire, $2.40 in carload lots; polished staples, $2.20, and galvanized staples, $2.60; painted barb wire, $2.60, and galvanized, $2.90. These prices are quoted on a Pittsburg base, plus the actual freight to destination. Cut nails are held at $2.05 in carload lots and $2.10 in less than carload lots, Pittsburg, plus freight to destination.

MERCHANT STEEL.—Demand for all kinds of merchant steel continues excellent and quotations remain firm as follows: Turned, cold rolled ground shafting in carload lots is quoted 50 off, and in less than carload lots, 45 off; tire steel, 1.80c in carload lots and 2c less than carload lots; toe calk, 2.10c to 2.25c; sleigh shoes, 2.10c to 2.25c; machinery steel, 1.70c; smooth machinery steel, 1.75c. Tool steel, 7 cents and upwards.

OLD MATERIAL.—Large buyers of old material are not going into the market at present prices and there is an accumulation of material that will certainly result in easier market conditions. Heavy melting stock is held at about $21 per gross ton while open-hearth crop ends are held at $21.50 to $22. Our quotations, gross tons, are as follows: Car wheels, $21 to $21.50; steel rails, mixed lengths, $21; rerolling lengths, $22.50 to $23; relaying rails, $27 to $29 and $30; old iron rails, $27; No. 1 cast scrap, $18.50 to $18.75; wrought turning, $13.50 to $14.

COKE.—According to the Connellsville *Courier* the production of the Connellsville region during the week ending Saturday, June 14, amounted to nearly 286,000 tons, a slight falling off from the previous week. Standard Connellsville furnace coke for prompt shipment is now held at $2.75 to $3, while on contracts $2.25 is quoted. Foundry coke for future delivery is quoted at $2.75 to $3, and outside cokes about 25 cents less.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
519 MONADNOCK BLOCK, June 24.

The proximity of the mid-summer season is impressing itself in a way upon the market. Trade is not quite so active. This must be regarded as a comparative statement, for the present volume of business is by no means inconsiderable. In pig iron it is even gaining and would be gaining still more rapidly, were buyers and sellers quite able to agree upon values and were the furnacemen ready to take quick action upon all the inquiries that are appearing. The billet market is not so active. Pressing wants appear to have been covered and while there is a ready sale for a large tonnage the market is taking its usual course without the quick snapping up of offerings noticed a few weeks ago. The present business in billets is mainly domestic product, foreign billets languishing because of higher cost, and the unusual conditions that surround transactions. Among the finished products, structural steel is being booked in liberal tonnages for 1903 shipments, one order for 5,000 tons having been placed here, while store trade is brisk. Material for another local structure, requiring about 400 tons of material, has been arranged for out of store, the price paid being about 3c for plain shapes. The inventory season for many of the Western consumers of finished iron and steel is at hand and this circumstance affects present trade. There is very little new buying. There is also a more limited specifying of material previously bought, for immediate delivery. But the consumers are specifying freely for those products that are somewhat difficult to procure and in many instances have named July as the date desired for shipment. There is every reason to anticipate a heavy consumption when the new season begins and also to expect that this new season will begin exceptionally early, in many instances in mid-July. Bar mills are on the point of closing for the annual renair work and this is giving to the scrap market a comparative dullness.

PIG IRON.—It is observable that the sellers of Southern iron for the first half of 1903 are in some instances quoting furnace prices instead of delivered. This is because of the uncertainty of freight rates for the coming year. The lines south of the Ohio river have been noting the upward flight of prices and have made some quite strong intimations that the freight rates may be advanced. The rise may be 50 cents and it may be more. Possibly the date when it takes effect may be postponed until January 1, for the cheap iron sales extend to about that date. Possibly, too, it may not take place. But the prospect is so formidable that it looks like an additional item to the cost of metal. There is quite an inquiry for pig iron for the first half of 1903 and in lots of 500 to 1,000 tons a fair amount of tonnage has been sold. There are inquiries running up to 4,000 tons but often neither buyer nor seller is in a hurry to close. One of the largest Southern makers is not quoting 1903 prices at all. The smaller furnaces are selling moderate lots for any deliveries that may be inquired for. Spot iron is very scarce. Some sellers are now trying to book spot orders with some little extension in the prompt deliveries asked for but the inquirers usually have imperative needs and continue the search for purely spot iron. Prices are somewhat higher. Local No. 2 is selling all the way from $21 to $22.50 with the possibility that before this appears in print the minimum quotation may be $22. Southern irons are selling anvwhere from $17 to $19, furnace, or from $20.65 to $22.65, Chicago, for No. 2 foundry, some spot iron bringing a premium even above this maximum quotation. We quote as follows:

Lake Sup. Charcoal...	$23 50 to $24 00	Southern Coke No. 4	$19 65 to $20 15
Local Coke Fdy. No. 1	22 00 to 23 50	Southern No. 1 Soft...	21 15 to 21 65
Local Coke Fdy. No 2	21 00 to 22 50	Southern No. 2 Soft...	20 15 to 20 65
Local Coke Fdy. No. 3	20 00 to 21 50	Southern Gray Forge	19 65 to 20 15
Local Scotch Fdy. No. 1	22 00 to 22 50	Southern Silveries....	21 15 to 21 65
Local Scotch Fdy. No. 2	20 50 to 22 00	Jackson Co. Silveries	24 50 to 25 50
Southern Coke No. 1	21 15 to 21 65	Ohio Strong Softeners	24 10 to 24 60
Southern Coke No. 2	20 65 to 21 65	Alabama Car Wheel..	24 65 to 25 10
Southern Coke No. 3	20 15 to 20 65	Malleable Bessemer..	22 00 to 23 00

BARS.—There is a fair trade in bars in medium and small sized lots. Doubtless the buying is stimulated by the expected closing of mills next week. Fairly good deliveries are obtainable in steel bars for the smaller sizes, though for the output of the larger rolls the accumulated orders are not perceptibly diminishing. The weakness in iron bars which had appeared several weeks ago with one or two Western mills appears not to have spread to other sellers. In fact the market has a rather firmer tone. Most producers are holding to about 1.80 to 1.85c for iron. Hoops are inclined to be quiet. We quote Chicago delivery, Bessemer steel, 1.75c to 1.85c; angles, less than 3x3, 1.85c; iron, 1.75c to 1.85c; hoops, 2.15c. Prices out of store: steel, 2c to 2.10c; iron, 2.15c to 2.25c; hoops, 2.40c to 2.45c; angles, 2.50c to 2.60c.

SHEETS.—Trade for sheets has a steady characteristic but deliveries are usually prompt and prices, while well held by the larger makers, show soft spots elsewhere. We quote No. 27 black, mill shipments, Chicago delivery, 3.15c to 3.25c; galvanized, 4.40c to 4.50c; out of store, No. 27 black, 3.45c to 3.55c; galvanized, 4.70c to 4.80c.

STRUCTURAL MATERIAL.—The Fowler building, a downtown structure now in process of construction, has had to be provided for in the matter of shapes by buying from warehouse stocks. About 400 tons are required and for this it is understood that about 3c was paid. There are many small orders for store and the tone of the market is very strong. For next year's trade, orders keep appearing. One producer sold over 5,000 tons during the past week. We quote mill prices as follows: Beams, 15 inches and under, 1.75c; 18 inches and over, 1.85c; structural angles, 3x3 to 6x6, 1.85c; angles, channels and tees, smaller than 3 inches, 1.85c base; plates, 1.75c. Prices on lots from store are based on the necessities of buyers and according to the size of order. Store prices vary from 2½ to 4 cents a pound.

BILLETS.—There is little activity in billets this week. Consumers have provided for their quick needs. Foreign billets have at least for the moment disappeared as a factor. German basic Bessemer had been quoted as low at $32.50, Chicago, but because of an increase in the ocean freight rates and a firmer feeling among sellers, that quotation cannot be duplicated. Domestic open hearth are quoted at $38.

RAILS AND TRACK SUPPLIES.—Inquiries are numerous and there are prospects for some large additional contracts in rails in the near future. We quote standard rails, $28; second quality, $27; light rails, 45 pounds, $34 to $35; 12 pounds, $40 to $41 with regular differentials for intermediate sizes; out of store, $45 to $50; splice bars, 2.25c; spikes, carload lots, 2.45c

to 2.55c; track bolts 3½x3¼, with square nuts, 2.85c per 100 pounds; with hexagon nuts, $3, with usual differentials for other sizes.

MERCHANT STEEL.—Because buyers have covered their wants for the coming season most effectually, the current inquiry is limited. But it is sufficiently in evidence to compel makers to decline some desirable business, because they can not make deliveries wanted. Prices are very firm. We quote mill shipments, Chicago delivery, as follows: Smooth finished tire steel, 1.95c to 2c; open hearth spring steel, 2.65c to 2.75c; sleigh shoe, 1.75c to 1.80c, flat sizes; concave and convex, 2c; out of store, 2.15c; cutter shoe, 2.40c to 2.60c; machinery steel, 2.15c to 2.25c, base; plow steel, 2.50c and upwards, according to quality; toe calk, 2.25c to 2.35c; out of stock, 3c to 3.10c; ordinary tool steel, 6c to 7c; specials, 13c and upwards; less than carload lots, 5 percent to 10 percent higher, cold rolled shafting, carload lots, 50 percent off, Chicago; less than carload lots, 45 percent off, Chicago., b. Chicago; 6-inch water pipe and larger sizes, $32; gas pipe $1 a ton higher.

CAST IRON PIPE.—There is moderate trade and prices are without change. We quote 4-inch water pipe $34 car load lots, f. o. b.

MERCHANT PIPE.—Some scarcity for the larger sizes is noticeable. Demand continues seasonable good and uniform and values are well maintained. We quote as follows:

MERCHANT PIPE, RANDOM LENGTHS.

	Black Per cent.	Galv. Per cent.
⅛ to ⅜ in.	56½	44½
¼ to 12 in.	63½	51½

BOILER TUBES.

Steel.

	Per cent.
to 1¾ in.	35
1¾ to 2½ in.	45
1¾ to 5 in.	55
6 to 13 in.	47½

Iron.

	Per cent
1¾ in.	35
1¾ to 2¼ in.	32¼
2½ in.	35
2¾ to 5 in.	42½

PLATES.—Transactions in plates are confined chiefly to warehouse orders, of which there are an abundance. Quotations are strong. We quote mill prices, Chicago delivery: Tank steel, ¼-inch and heavier, 1.75c to 2.15c; flange steel, ¼-inch and heavier, 1.85c to 2.25c; from stock, tank steel, ¼-inch and heavier, 2.20c to 2.35c; 3-16, 2.30c to 2.45c; No. 8, 2.35c to 2.55c; flange steel, 2.35c to 2.50c.

WIRE AND WIRE NAILS.—Trade in wire and nails would be regarded as excellent under any conditions. Production however is increasing and fairly prompt deliveries can be made But the product of the mills is going directly into the market, the demand being sufficient to absorb it, and prices are firm. We quote as follows: Smooth wire carloads, $2.15; painted barb wire, $2.75; galvanized barb wire in carload lots, $3.05; wire nails, carload lots, $2.20; staples, carload lots, $2.30; jobbers' prices to retailers, 5 cents higher than above for carload lots, and 10 cents higher for less than carload lots.

COKE.—Those foundrymen who have accumulated stocks are congratulating themselves. The product is becoming scarcer and the market has advanced about 25 cents. While shipments on contract are well maintained it is difficult to place new orders. We quote 72-hour Connellsville foundry, $5.50; for spot delivery, $5.75; Virginia and West Virginia coke, $5.25 to $5.50.

OLD MATERIAL.—Quiet is the present tone of the market. This is because the demand has decreased, mills not taking anything offered except what looks like a bargain. There is a slightly easy tone, but values have suffered very little. We quote gross tons as follows:

Old iron rails	$24 00 to $25 00	Relaying rails	31 00 to 31 00
Old steel rails, long lengths	22 50 to 23 00	Old wheels	19 50 to 20 00
Old steel rails, short lengths	17 00 to 18 00	Heavy melting steel	18 00 to 19 00
		Mixed country steel	13 50 to 14 00

The following are selling prices per net ton:

No. 1 R. R. wrought	$19 50 to $20 00	Steel axles	$19 00 to $19 50
No. 2 R. R. wrought	18 00 to 18 50	Cast borings	9 00 to 9 50
Dealers' forge	15 50 to 16 00	Wrought turnings	13 00 to 13 50
No. 1 busheling	13 50 to 14 00	Iron axle turnings	13 50 to 14 00
No 1 R.R. & mch. cast	14 25 to 14 75	Steel axle turnings	13 00 to 13 50
Railway Malleable	15 00 to 15 50	Stove plates	11 00 to 11 50
Country malleable	13 00 to 14 00	Old iron splice bars	21 00 to 21 50
Pipe and flues	24 50 to 25 00		

The product of the Pennsylvania Steel Co. will be sold in Chicago after July 1 by Clifford J. Ellis, sales agent for the Cambria Steel Co. No change will be made in the Chicago management of the Cambria Steel Co., Mr. Ellis continuing in charge.

CLEVELAND.

OFFICE OF *The Iron Trade Review*,
1064 ROSE BUILDING, June 25.

PIG IRON.—A 3,000-ton transaction in Virginia basic for delivery in the Cleveland district is the largest sale of the week. The beginning made last week in inquiry for foundry iron for 1903 seems not to have been followed up, and the general attitude of the foundry trade in this vicinity is one of waiting. For near-by deliveries inquiries continue to come in but there is so little iron to be had for this year that the business done is insignificant. For next year's delivery $21 at furnace is asked by some Ohio furnaces; in other instances this is shaded, and there are furnaces asking more. The general belief of foundrymen is that the price will not go higher and that they will not lose by waiting. On the other hand are those who have taken contracts for castings and want to cover, but these are a minority. The factor that cannot be reckoned is the amount of iron promised for 1902 that cannot be delivered until next year. The interruptions of the coal strike are adding daily to the volume of postponed deliveries. The Southern Ohio furnaces referred to last week as having banked are still in that condition, and the Columbus, O., furnaces that produce foundry iron have only sufficient coke for a few days, with the prospect of partial curtailment. Bessemer iron is inactive and is likely to remain so for some time. We quote the Cleveland market as follows:

Bessemer	$21 75 to $22 25	Scotch No. 1	$21 75 to $22 75
No. 1 Strong F'dry	21 75 to 22 25	Scotch No. 2	21 5 to 22 20
No. 2 Strong F'dry	21 75 to 22 75	Gray forge, Valley	19 75 to 20 25
No. 3 Foundry	19 75 to 20 25	LakeSuperior charc'l	22 00 to 23 05

FINISHED MATERIAL.—The announcement that the American Shipbuilding Co. has closed six freight vessels for the coming season's work has been made in the week. Much of the material for these was included in the 19,000 tons of plates and shapes bought in the earlier part of the month as already noted. There are still inquiries out for more shipbuilding materials, both for the consolidation and for independent builders. The inequalities in the price of plates already referred to continue, some mills getting $2 to $3 a ton more than others because they are making earlier deliveries. On this year's new business 1.80c to 1.85c Cleveland is paid, though contracts for 1903 are booked at 1.70c. The sheet trade is in fair condition—no rush of business, but better activity than was noted a month ago. Though there is not enough business for all the mills there is no great pressure to sell. On heavier sheets the market is particularly well sustained. We quote 2.10c to 2.15c Cleveland for 3-16-inch and heavier and 2.25c Cleveland for No. 8. Cleveland prices continue on the following basis on mill sales of black sheets: No. 2[illegible] 2.90c to 3c; No. 26, 3c to 3.10c; No. 27, 3.10c to 3.20c; and the following prices out of stock: No. 10, 2.35c to 2.50c; No. 12, 2.45c to 2.60c; No. 14, 2.55c to 2.70c; No. 16, 2.95c to 3c; No. 18, 3c to 3.15c; No. 20, 3.05c to 3.20c; Nos. 22-24, 3.15c to 3.30c; Nos. 22-26, 3.25c to 3.40c; No. 27, 3.35c to [illegible] No. 28, 3.45c to 3.60c, for one pass cold rolled. For full cold rolled .10c extra is charged. On galvanized sheets Cleveland prices to consumers are as follows for carload lots: Nos. 10 and 11, 3.15c; Nos. 12 to 14, 3.25c; Nos. 18 to 21, 3.55c; Nos. 22 to 24, 3.85c; No. 27, 4.35c; No. 28, 4.60c. There is some activity in bars in view of the shut-down of the mills in this city and the Mahoning Valley for the first two weeks in July. Early deliveries command a premium and mills have been trying to get a little stock ahead for July shipment. On bar iron 1.80c Pittsburg is maintained, and on Bessemer steel for delivery in the next two or three months, 1.60c to 1.70c Pittsburg. For bars out of store 1.90c to 2c Cleveland is the market.

OLD MATERIAL.—The coming shut-down of the mills for repairs have made buying light of such scrap as goes to rolling mills. In foundry scrap there is a steady market, but buying is in limited quantities in view of the high prices. We quote the Cleveland market, all gross tons, as follows:

Old iron rails	$ 26 00 to 27 00
Old steel rails (6 ft. and over)	22 00 to 23 00
Old steel rails (6 ft. and under)	19 00 to 20 00
Old car wheels	18 00 to 19 50
No. 1 R. R. wrought scrap	21 50 to 22 00

Mill scrap	20 00 to 20 50
No. 1 machine cast scrap	17 50 to 18 50
Iron axles	28 00 to 29 00
Axle turnings	18 00 to 18 50
Wrought turnings (free from cast)	14 00 to 14 50
Cast borings	9 50 to 10 00
Uncut wrought iron boilers	11 00 to 12 00
Steel boiler plates	16 00 to 17 00
Grate bars	11 50 to 12 50
Pipes and flues (clean)	17 00 to 18 00
Tank iron	17 00 to 18 00
Hoop and band iron	13 50 to 14 50
Sheet iron	11 50 to 12 00
Wrought drillings	13 00 to 13 50
Malleable iron	17 00 to 18 00
Stove plate	13 00 to 14 00
Heavy steel	18 50 to 19 00

CINCINNATI.

June 25.

The feature about the iron market the past week has been the sale of iron for delivery during the first half of 1903. There have been a few lots sold for this delivery previous to this time but they have been scattering and of not much consequence. A large Southern producer, however, has been taking orders since June 20 for 1903, delivery in considerable amounts. The strike has had some effect on the market as a matter of course, but its influence has not been great as it might have been. It is generally believed that there will be an advance in the freight rate on Southern irons within the next few weeks, private advices being to the effect that such an advance will likely take place before August 1. The rate is now $2.75, Birmingham to Cincinnati, and if any advance were made it would be one of 50 cents.

In the various branches of the iron trade conditions remain very firm and business is entirely satisfactory. Manufacturers needing finished material have shown no disposition to curtail their orders, and the large consumers of special castings appear to have an almost unlimited demand for their own product which makes it necessary for them to be steady customers of the foundries at the same rate at which they have been going. Building is very active, not only in Cincinnati proper, but in the suburbs and in this immediate territory. New factories are being erected in all parts of the city adjacent to railroad tracks and a large number of new steel structures are being undertaken in the heart of the city.

Pig Iron.—During the past week it has been noticeable that consumers of pig iron have not been so anxious for shipments as they were some time ago. This is not taken to mean that there is any less demand but it is explained by the fact that the furnaces are now making shipments somewhat more satisfactorily than they did. During the time that iron was so hard to get from some of the large Southern producers, consumers went into the market and bought wherever they could. Now that iron is being delivered on old contracts the buyers find that they have a little more than they contracted for and they are even asking in some cases that shipments be held up for a few weeks.

There has been some selling of iron for immediate delivery during the past week or so. The iron has been mostly of off grades amounting in this market to something like 1,500 tons offered by Southern producers. The price has been on the basis of $20 for No. 1 silvery, at Cincinnati. It is understood that some of the large producers have iron that they will offer for delivery during the remainder of the year, the Sloss-Sheffield having announced in a way that it will have about 50,000 tons to sell. This company is also understood to have sold 20,000 tons so far for delivery during 1903, the first half. Sales for delivery during the first half of 1903 are on the basis of $16.50 to $17.50 for No. 2 at Birmingham, the consumer taking the risk of an advance in the freight rate. Iron has been sold in considerable quantities during the past few days for the Eastern market. Following are quotations on iron at Cincinnati:

Southern Fdy. No. 1	$20 75 to 21 75	Gray Forge	$19 00 to 20 00
" " 2	20 25 to 21 25	Northern Fdy. No. 1	24 10 to 24 60
" " 3	19 75 to 20 75	" " 2	23 60 to 24 10
" " 4	19 25 to 20 25	Southern C. W. iron	25 25 to 25 75
So. Fdy. No. 1 soft	20 75 to 21 75	Malleable coke iron	22 75 to 23 50
So. Fdy. No. 2 soft	19 75 to 20 75		

Finished Material.—There has been practically no change in either the price or the general demand for finished material. Structural shapes have been wanted more than anything else and there is evidently a very heavy building period now on. An effort is being made to establish at Cincinnati a large rolling mill with local and outside capital and it is understood that the new enterprise would have a large line of custom if it were to begin operations. There are no changes in prices from the last report, bar iron remaining at 1.92c and bar steel at 1.72c, both iron and steel bars being quoted at 2.20c out of store. Angles are 2.35c and 2.50c out of store. Sheets are quoted at 2.50c for No. 12 and 2.35c for No. 10.

Old Material.—The market for scrap has been rather quiet. There has been no great demand and consumers appear to have pretty well covered their needs in the pig iron market. The regular buyers of scrap are taking it in moderate amounts. Following are prices in this market.

Old No 1. Wrought Railroad, net tons	$ 19 50 to 20 00
Cast Machine and Foundry, net tons	14 00 to 14 25
Old Iron Rails, gross tons	25 00
Old Steel Rails, gross tons	24 50 to 24 75
Old Short Lengths, gross tons	17 50 to 18 00
Old Iron Axles, gross tons	25 00
Old Iron Car Wheels, gross tons	19 00 to 19 50
Stove Plates, gross tons	11 00 to 11 25
Wrought Turnings, net tons	14 00
Cast Borings, net tons	8 50 to 8 75

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1909, NO. 150 NASSAU ST., June 24.

Pig Iron.—The conditions in the market underwent no change during the past week, the scarcity of iron still constituting the chief topic of discussion. In some quarters there is a most urgent demand for pig iron for delivery in the near future, but even with the extra inducement of from $2 to $3 premium per ton, there is little or no response. At the present writing spot delivery, particularly in any quantity, borders on the impossible. Foreign irons continue to be sought. Producers across the ocean are rather more disposed to refuse orders from here at prices recently prevailing. Good authorities incline to the opinion that very little foreign iron will be available after Sept. 1, arguing that foreign producers will either have exhausted their supply of material then, so far as filling orders from the United States is concerned, or that an advance in ocean freights will take place then, making it unprofitable to do business here. Quite a diversity of opinion exists as to the amount of foreign irons already contracted for in the East. Some put it as high as 50,000 tons, but 25,000 tons is regarded as a conservative estimate. Some orders for 1903 delivery are being taken now, although there is an indisposition to do anything in that line at present. One order for 10,000 tons of No. 2 foundry for 1903 delivery was booked in the week at $17, Birmingham. It is said that other orders on the same basis will be given in the near future. As to the outlook, there are many who think that the present aspect of the market will continue until the first half of next year, particularly if the corn crop measures up to expectations. Prices for delivery here range as follows: No. 1 X Northern, $22.50 to $24; No. 2 X Northern, $21.50 to $23; No. 2 Plain, $21 to $22.50; No. 1 foundry, $21.75 to $22.75; No. 2 foundry, $20.75 to $21.75; No. 3 foundry, $20.50 to $21.25; No. 4 foundry, 20.25 to 20.75.

Finished Iron and Steel.—Structural material still continues to be greatly in demand, with importations of foreign material on the increase. Reports from various centers are to the effect that building operations of large proportions are contemplated. In Greater New York "sky scrapers" seem to be in great favor, and scarcely a week passes without some being announced. Spot material has commanded as high as $10 per ton premium over pool prices. Prices for New York are as follows: Beams and channels, 15-inch and under, 1.75c to 1.95c; angles, 3 to 6-inch, 1.75c to 1.85c; zees, 1.75c to 1.95c; bulb angles, 2.05c to 2.25c; deck beams, 2.05c to 2.25c; sheared tank plates, 2.10c to 2.15c; flange, 2.20c to 2.25c; firebox, 2.30c to 2.35c; refined bars, 1.95c to 2c; soft steel bars, 1.95c to 2.05c. The sheet market at present is rather dull for the season, producing capacity exceeding demand. We quote as follows: No. 28, black, in carloads delivered New York, 3.50c to 3.75c; No. 28, galvanized, 70, 10 and 5 off.

PHILADELPHIA.

June 24.

Furnaces in the Lehigh district continue to shut down on account of lack of fuel. Buyers are ruling the foreign market. Low phosphorus English iron has sold here this week in lots of 500 and 2,000 tons. Large lots of steel have been entered for delivery through Newport News, Baltimore, Philadelphia, New York, Boston and via the St. Lawrence to

Cleveland, Chicago and other lake cities. Coal has also been purchased abroad. At the same time, domestic producers have obtained contracts for locomotives and other high grade machinery in foreign lands. Home demand is still urgent for heavy lines, especially railway equipment and structural material, which are contracted for well into 1903.

PIG IRON.—Buyers are more generally negotiating for foundry iron for delivery during 1903. For this year's deliveries metal is extremely scarce. More furnaces in the Lehigh Valley are compelled to bank, and more foreign iron will be needed. Low phosphorus English iron has been sold here lately to the amount of 5,000 tons, and for foundry use Middlesboro and Scotch irons will be in greater demand. Prices are about as follows for city and nearby deliveries during the last quarter of 1902 and the first quarter of 1903: No. 1 X foundry, $23 to $23.50; No. 2 X foundry, $21.50 to $21.75; No. 2 plain, $20.75 to $21.25; standard gray forge, $19 to $19.50; ordinary gray forge, $18.50 to $18.75; basic, $20 to $20.50. Prompt shipments, low phosphorus, $22.50 to $23; No. 3 Middlesboro, $20.50 to $21; Scotch irons, $21.50 to $23.

BILLETS.—American steel is nominal, as no actual business has been reported. Foreign steel is easier. From $30 to $31 is the range.

FINISHED MATERIAL.—The strike in the coal regions cuts off considerable business in that section, and as many of the bar mills recently affected by strikes have resumed work, there is less difficulty in getting deliveries and prices are easier. Plates are steady with a very good demand and excellent prospects ahead for a large volume of business. Structural material is still very scarce, but the steady receipts from abroad do much to relieve the stringency which has been so noticeable for many months past. Prices are about as follows: For small lots of plates, 2.10c to 2.15c; carload lots and upward: ¼-inch and thicker, 2c to 2.05c; universals, 2c to 2.05c; flange, 2.10c to 2.20c; firebox, 2.25c to 2.30c; marine, 2.30c to 2.35c. Refined iron bars, 1.95c to 2c. Steel bars, 1.72c to 1.80c, but 2c and upward is done on early deliveries. Beams and angles 2.25c to 2.50c.

LAKE SUPERIOR IRON MINES.

The Ironwood (Mich.) board of review has reduced the valuation of the Newport mine, a Schesinger property, from $333,000 to $100,000. There is comparatively little ore in sight at the mine at present.

The Union Steel Co., of Donora, Pa., is taking a large tract of land near the Volunteer mine, Cascade Range, and will explore it.

The Donora Mining Co. has obtained an option from Morton Miller on the Holman property near Grand Rapids, Mich. The price paid by Miller was $180,000 and it is understood that his selling price is not less than $300,000.

Mining operations have been resumed on a small scale at the old Northwestern mine on the Felch Mountain range, which is 12 miles north of the Menominee range proper. The Northwestern has been idle since 1884. Bessemer ore has been proved up at the mine with a diamond drill. Commissioner of Mines Newett in his report for 1899 said of the Felch Mountain district: "There is a chance for the finding of something valuable in this section. It was never explored thoroughly except at a few points."

It is reported at Duluth that W. P. Snyder and others have taken an option on the Auturius mine on the western end of the Mesabi Range. Several months ago, an option for the purchase of the property was given through Charles Purden and the Eaton brothers to George C. Howe, P. L. Kimberly and others. This option is supposed to expire July 12.

George W. Wallace, formerly one of Corrigan, ----inney & Co.'s superintendents, has been awarded the contract for stripping the new Republic mine northeast of Buhl, Minn. The contract calls for the removal of 1,000,000 cubic yards of earth.

A number of miners in the copper and iron districts of Michigan will soon leave for South Africa, now that peace has been declared. Many miners employed in South Africa at the time hostilities commenced came to this country and are now anxious to return to the gold fields.

The Chicago & Northwestern Railroad is preparing to improve its ore shipping facilities at Escanaba, Mich. A new dock will be located at North Escanaba just south of No. 5 ore dock. It will be the largest on the lakes, with a length of 1,920 feet and height of 70 feet. It will contain 320 pockets, each having a capacity of 160 tons, or a total capacity of 51,200 tons.

AGREEMENT WITH PITTSBURG MOLDERS.

The settlement of the wage questions at issue between Pittsburg foundrymen and molders was referred to in these columns last week. We are now able to present the full text of the agreement. The original communication from the molders was dated May 29. It stated that in view of the condition of trade and the unusual expense of living the molders had decided to ask for an advance of 10 percent, making the minimum rate $3.30 for nine hours. A general conference committee of seven was appointed at the same time to meet the founders. The Pittsburg members of the National Founders' Association and some other Pittsburg founders appointed a committee to confer with the molders' representatives. Two days were spent in discussing the matters at issue, a number of questions being raised by the foundrymen. The proceedings throughout were thoroughly amicable and businesslike. It will be noticed from the subjoined agreement that the advance decided on is 20 cents a day, and that the parties to the agreement pledge themselves to be governed by the New York agreement, and therefore will have no strikes or lock-outs pending wage adjustments in the future. The results of the settlement mean an important advance step in the relations of Pittsburg molders and foundrymen:

"This agreement entered into this 13th day of June, 1902, between a committee representing the I. M. U. N. A. members of Nos. 46, 243 and 270, and a committee representing the Frank-Kneeland Machine Co., Lincoln Foundry Co., Wm. Yagle & Co., Phillips & McLaren, Best Mfg. Co., Mesta Machine Co., Taylor, Wilson & Co., Jas. Rees & Son, Rosedale Foundry Co., Pittsburg Steel Co., Hall Steam Pump Co., W. J. Early & Sons, Marshall Foundry Co., Union Steel Casting Co., Pittsburg Mfg. Co., Porter & Co., Sterritt & Thomas, Union Foundry & Machine Co., Thos. Carlins' Sons, National Gear Wheel Co., Washington Foundry Co., G. A. Hogg Iron & Steel Co., A. Garrison Foundry Co., Chilled Roll Foundry Co., McIntosh, Hemphill & Co., Jelly & Co., Springfield Foundry Co., Columbia Iron & Steel Co., and the Velte Foundry & Machine Co.

Witnesseth: That from and after July 1st, 1902, until July 1st, 1903, the advance of 20c per day be paid to each molder in the employ of the foundries represented at this conference, and to such molders as were employed at the beginning of the coremakers' strike, if such molders are re-employed,

That the minimum rate of wages remain at $3 per day for 9 hours.

That overtime will be paid at the rate of time and half-time for hours' work over fifty-four per week.

That double time will be paid for Sunday, 4th of July, Labor Day, Thanksgiving and Christmas.

That both parties agree that it is to their mutual interest to see that fair dealing is the cardinal principal in our intercourse with each other; and that all disputes hereafter arising shall be settled in accordance with the New York agreement.

That this agreement shall be in force as between the parties represented hereby, for one year from July 1, 1902; and that provided any change is desired at the expiration of that time, notice be given on or before April 1 preceding the expiration of this contract, stating changes desired. If no notice is given the contract will be in force for one year.

Committee of I. M. U. N. A.—John Murto, John Barnett, John Flinn, Tim Kaye, E. J. Muehlman, Wm. Dolin, Ed. Rause.

Committee of Manufacturers.—George Mesta, Jos. Fawell, Robt. Taylor, F. A. Campbell, Wm. Yagle, Augustus Trump, I. W. Frank.

The Reading Iron Co., Reading, Pa., York Rolling Mill, York, Pa., and the Susquehanna Iron & Steel Co., Columbia, Pa., have granted the puddlers in their employ the advance in wages asked, from $4.25 to $4.50 per ton. The puddlers at the Susquehanna plants, however, refused to return to work, as the finishers did not receive the advance asked for. The puddlers employed by the American Iron & Steel Mfg. Co., Lebanon, Pa., are still out on account of the refusal of the company to grant the increase.

THE IRON TRADE REVIEW

Devoted to the Machinery, Metal-Working and Foundry Trades, and Iron and Steel Manufacture.

PUBLISHED EVERY THURSDAY BY

THE IRON & STEEL PRESS CO.,

ROSE BUILDING, CLEVELAND, OHIO.

G. H. GARDNER, President and Treasurer.
JOHN A. PENTON, Vice-President.
A. I. FINDLEY, Secretary.

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CHICAGO : 519 Monadnock Block, GEO. H. GRIFFITHS, Manager.
PITTSBURG : 429 Park Building, A. O. BACKERT, Manager.
NEW YORK : 150 Nassau St., D. C. WARREN, Manager.
THE CENTRAL WEST : R. A. EVANS, Manager.

Subscription, $3.00 per annum. To Foreign Countries, $4.00.
Advertising Rates Furnished on Application.

The Cleveland News Co. will supply the trade with THE IRON TRADE REVIEW through the regular channels of the American News Co.

ENTERED AT THE POST OFFICE AT CLEVELAND, O., AS SECOND CLASS MATTER

JUNE 26, 1902.

We announce with pleasure an addition to the editorial staff of *The Iron Trade Review*. Mr. George Smart, a journalist of experience, heretofore of Columbus, O., Cleveland and Washington, D. C., becomes associate editor.

THE STEEL CORPORATION AND TECHNICAL SCHOOLS.

The presence of the president and first vice president of the United States Steel Corporation on June commencement platforms and their addresses to two classes of graduates give occasion for a word on the attitude of the steel corporation toward school-trained men. President Schwab has been quoted as attaching little value to college education. At the commencement of Pennsylvania State College two weeks ago he referred to his address a few years previous before the New York Manual Training School, in which he had told the boys that a college education was not necessary to their success. He explained that while this was true as applied to these boys, he favored a college education and was not opposed to it, as he had been quoted. In the same week First Vice President James Gayley, addressing the graduates from his old academy at Nottingham, Md., emphasized the value of an education that makes a young man able to apply common sense to every-day problems. He used the country-bred boy, suddenly called on to reckon with a broken wheel and a loaded wagon, as an illustration, and pointed out that the boy who could use a fence rail and a rope to save the day was of the sort that business men everywhere are hunting for today.

It may not be generally known that these recent utterances of its chief officials are in line with a policy recently decided upon by the United States Steel Corporation. Through the officers of its subsidiary companies the world's largest corporation proposes to keep in constant connection with the leading technical schools of the country, and will ask the presidents of these institutions to recommend to it from time to time the most promising of their graduates. It is definitely understood that the young men sought are not necessarily those who have made the best term standings, but those who have shown the most promise of ability to bring things to pass, to apply means to an end. While it is true that the regime of these schools may not make it easy to judge young men from the standpoint of their ability to use themselves and to apply their training, that criterion is the one to be kept constantly in mind in recommendations for places in the service of the steel corporation.

The question has been often asked whether the industrial consolidations, in superseding the proprietor or the majority holder in a stock company, managing a business largely his own, can secure the needed intensity of effort from salaried men or the same strain for a record that comes from the spur of proprietorship. The achievements of the steel corporation thus far, with economies already introduced saving $9,000,000 a year over former records, are one answer. The rapid extension of the Carnegie policy to every part of the organization, and the broad plans insuring a picked personnel for the future, are another. And if there be any who consider that the industrial captains who are now responsible for the success of the various subsidiary companies of the steel corporation cannot well be replaced, they need only be reminded that another feature of its policy is that every man in a place of responsibility has his under-study who in case of his disability or his retirement would step promptly into his place. This is true from presidents down the line to all departments of selling, financing or manufacturing operations.

Most significant index to the careers that await the best men of the technical schools, who are looking toward iron and steel manufacture as their life work, is the prominence given graduates of the operating departments in picking men for the larger spheres of management and supervision in the various component companies. If the Carnegie organization has given prominence to men whose only technical school was that of the mill or the furnace, it was because they showed peculiar genius for management. At the same time it is to be remembered that this company has also had among its most conspicuous figures those who came up by way of the technical school as well as the works. And more and more is this combination demonstrated to be the ideal one.

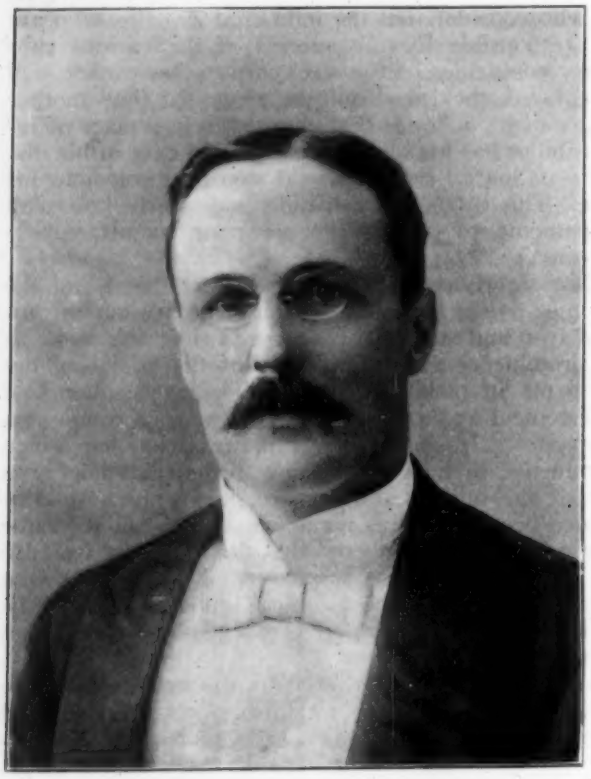
Another question answered by the new relation the steel corporation is to establish with the technical schools, is the one frequently propounded as to the oppotunity for young men under the trust regime. In his address at Pennsylvania State College, President Schwab said that the one thing that stands in the way of the success of consolidations is the lack of men to manage them. "Ability is now sought everywhere," he added. "Capitalists bemoan the lack of it." Every-day developments show the above statement as to the lack of men of conspicuous ability to be literally true. The consolidations are not taking away the opportunities of young men. They are creating a larger and larger number of places calling for large equipment, and are steadily making greater the prizes of position and honor awaiting the technical school graduate who has not neglected the school of applied common sense.

The Morgan Engineering Co., of Alliance, O., announces, in view of the report in circulation that there has been a consolidation of that company and the Wellman-Seaver Engineering Co., of Cleveland, which recently changed its name to the Wellman-Seaver Engineering Co., that there is no connection direct or indirect between the Morgan Engineering Co. and the Wellman-Seaver-Morgan Engineering Co. The Morgan Engineering Co. also announces that having acquired the Eck patents under which the charging cranes of the Midland Steel Co. were manufactured, it is engaged in the manufacture of furnace charging cranes for all purposes, as well as charging boxes for use with any make of charging machine or crane.

John A. Jones, of East Chicago, Ill., has been appointed vice president of the Fourth District of the Amalgamated Association to succeed W. W. Insley, resigned.

THE NEW PRESIDENT OF THE A. F. A.

Arthur W. Walker, president of the Walker & Pratt Mfg. Co., Watertown, Mass., was elected president of the American Foundrymen's Association at the Boston convention last week to succeed the late John G. Sadlier, of Springfield, O. The new president is a conspicuous exponent of the highest ideals and advancement in the art of founding. The stove foundry which his company operates if it is not the largest is without doubt the most complete in existence. Having just passed his fortieth year, in the vigor of his manhood, he is planning many further improvements for his plant and for the betterment of the social condition of the men in his employ. The works as they stand today were conceived by himself with the assistance of several officials of the company, to whom he gives due credit, and are the result of several years of study. The plant was built along the lines of lessening the cost of production and at the same time giving the employes the greatest amount of comfort while engaged in their work. In both respects success marked their efforts. While the molders are given a clean, bright, well-ventilated and modernly equipped



ARTHUR W. WALKER, PRESIDENT.

floor, the other departments have been similarly laid out. For the comfort of the men a large lavatory is provided, containing baths for nearly all and a locker for each man. Coffee is served at the noon hour at the cost of 2 cents a pint, the firm paying the boys who do the serving. Other features along these lines are to be introduced from time to time all of them being conceived for the benefit of the emplowes.

A graduate of the Massachusetts Institute of Technology, Mr. Walker is a thorough technical as well as a practical man, having gone into the foundry to learn the every-day side of the business after leaving school. The company of which he is president had its beginning in 1853, his father having built a foundry near the site of the present one. In 1897 the old plant was torn down and operations commenced in the new one. That the molders employed have no complaint to make regarding their earnings appears in the statement that the company's books for the year ending January 1, 1902, show an average wage of $4.37 a day.

The conference between the American Tin Plate Co. and the Amalgamated Association for the adjustment of the footnotes of the tin plate scale for the ensuing year will take place in New York on Monday, June 30. It is not probable that much difficulty will be experienced in deciding upon the new footnotes as no very radical changes are asked by the Amalgamated Association.

HARBISON-WALKER REFRACTORIES CO.

The Harbison-Walker Refractories Co., of Pittsburg, has completed its organization by the election of the following board of directors: S. P. Harbison, S. C. Walker, H. W. Croft, J. B. Cullum, F. H. Seeley, James H. Reed, F. H. Wigton, George Reese, H. F. Bigler, Alexander Patterson, T. H. Given, R. W. Fredericks, William A. Stanton, T. L. Chadbourne, Jr., and Hay Walker, Jr. S. P. Harbison has been elected chairman and S. C. Walker president. The consolidation has taken over the properties of the following companies: Harbison-Walker Co.; Harbison & Walker Co., of Kentucky; Isaac Reese & Sons Co.; Phillipsburg Fire Brick Co.; Wallaceton Fire Brick Co.; Basic Brick Co.; Clinton County Fire Brick Co.; Fredericks, Munro & Co.; American Fire Brick Co.; Layton, Pa., plant of the Fayette Mfg. Co. and the Clearfield Fire Brick Co. All of the above with the exception of the Harbison & Walker Co. are Pennsylvania corporations. The company controls 27 complete plants with a capacity of 1,000,000 tons of high grade finished material per year. It also controls 52,000 acres of fire clay, coal and

RICHARD MOLDENKE, SECRETARY.

ganister lands and the companies taken over have cash and quick assets amounting to $1,900,000, which are to be used as working capital. The company has issued $8,000,000 of preferred cumulative stock paying 6 percent, $14,500,000 common and $3,500,000 first mortgage and collateral trust bonds carrying 5 percent interest. Of this amount the company is offering for sale $2,000,000 worth through the Farmers' Deposit National Bank and the Colonial Trust Co., of Pittsburg, at 102½, subscriptions to close on Friday, June 27, at 3 o'clock. During the past two years the companies taken into the combination have made an annual profit of $806,752.11 and on a basis of increased output due to the erection of new works it is believed that the annual profit will be increased to $1,116,000, which is not only sufficient to pay the preferred dividends and the interest on the bonds but also to provide a dividend on the common stock.

The Youngstown Truss & Cable Fence Co. has been incorporated with a capital of $10,000, has purchased the plant of the Truss & Cable Fence Co., of Hornellsville, N. Y., and will move it to Youngstown, O., within the next six months. The principal output will be wire fencing. Among those interested are: W. A. Reade, of the Reade Machinery Co., Cleveland; and W. W. Bonnell, formerly of the Finished Steel Co.; Carl Horix, manager of the George B. Sennett Co.; W. Scott Bonnell and C. D. Hine, all of Youngstown.

Iron and Steel Production in the United States in 1901.

The report of General Manager James M. Swank of the American Iron and Steel Association, for the year 1901 contains an unusually interesting feature in its pig iron statistics—the division of the output into Bessemer, foundry, gray forge, basic, etc. This classification has been made in part heretofore—that is, so far as giving Bessemer and basic production separately; but foundry and mill irons have never been separated heretofore. The following table gives by grades the total production of pig iron in 1900 and 1901. White and mottled pig iron made with charcoal is included in the charcoal iron reported:

Grades—Gross tons.	1900	1901
Bessemer and low-phosphorus pig iron	7,978,209	9,589,936
Basic pig iron	1,072,376	1,448,850
Forge pig iron	793,092	639,184
Foundry pig iron	3,037,689	3,186,348
Malleable Bessemer pig iron	173,413	256,532
Charcoal pig iron	339,874	360,147
White and mottled and miscellaneous grades	129,990	97,374
Spiegeleisen and ferro-manganese	255,977	291,461
Direct castings	8,703	8,522
Total	13,789,242	15,878,354

Of the total production of pig iron in 1901 over 60 percent was Bessemer and low phosphorus, over 20 percent was foundry, over 9 percent was basic, over 4 percent was forge, over 2 percent was charcoal, almost 2 percent was spiegeleisen and ferro-manganese, and over 1.6 percent was malleable Bessemer. The production of white and mottled and of miscellaneous grades of pig iron amounted to much less than 1 percent, while that of furnace castings was still less.

The following table gives the production by States of Bessemer and low phosphorus, basic, and forge pig iron in 1900 and 1901:

States—Gross tons.	Bess. and low-phos.		Basic.		Forge.	
	1900	1901	1900	1901	1900	1901
New York	10,530	16,239		4,014	31,435	12,596
New Jersey	37,352	12,253	4,929	30,306	33,976	31,548
Pennsylvania	4,270,800	4,885,877	790,608	1,011,260	352,557	313,740
Maryland	260,588	297,149			806	1,280
Virginia			62,043	80,945	37,234	34,121
West Virginia	166,758	166,597				
Kentucky	7,430				4,177	1,987
Tennessee	6,000		220		35,669	9,638
North Carolina	3,044					
Georgia					1,043	
Alabama			117,454	220,499	181,885	131,040
Ohio	1,898,663	2,637,091	61,966	79,477	105,780	91,922
Illinois	1,178,241	1,394,430			6,253	
Wisconsin		33,084	11,329		1,177	638
Minnesota	20,667					
Missouri			23,827	22,349	1,100	10,674
Colorado	118,146	147,216				
Total	7,978,209	9,589,936	1,072,376	1,448,850	793,092	639,184

The following table gives the production by States of foundry, malleable Bessemer and charcoal pig iron in 1900 and 1901:

States—Gross Tons.	Foundry.		Mall. Bessemer		Charcoal.	
	1900	1901	1900	1901	1900	1901
Massachusetts					3,310	3,386
Connecticut					10,233	8,442
New York	221,096	214,835	17,976	10,705	7,920	22,605
New Jersey	63,389	50,898	3,000			
Pennsylvania	767,343	845,309	8,456	61,073	3,422	4,761
Maryland	1,576	2,135			3,196	2,022
Virginia	382,717	328,795			2,779	2,474
Kentucky	58,642	66,475	250			
Tennessee	301,751	321,140	1,297		3,119	2,917
Georgia	1,564				22,879	27,333
Texas					10,150	2,273
Alabama	765,114	765,755			57,632	53,010
Ohio	344,367	426,152	41,876	69,480	7,737	10,067
Illinois	44,355	81,327	65,830	60,614		
Michigan					163,712	170,762
Wisconsin	85,075	83,527	33,578	54,660	32,773	35,273
Mo. and Wash	700		1,150		11,012	14,222
Total	3,037,689	3,186,348	173,413	256,532	339,874	360,147

The table below shows production by States of white and mottled pig iron made with mineral fuel, and of miscellaneous grades of pig iron in 1900 and 1901; also of spiegeleisen and ferro-manganese and of castings made direct from the furnace.

States—Gross Tons.	White and Mottled and Miscellaneous.		Spiegeleisen and Ferro-Manganese.		Direct Castings.	
	1900	1901	1900	1901	1900	1901
New York	1,407	2,668	2,473			
New Jersey	5,869	1,952	21,847	28,789		
Pennsylvania	33,044	24,542	135,297	191,394	4,408	5,301
Maryland	210		23,597			
Virginia	5,834	2,259			10	75
Kentucky	1,063					
Tennessee	13,621	3,354			513	90
Georgia	454					
Alabama	57,520	49,501	1,060	2,351	3,672	3,056
Ohio	10,432	12,236			90	
Illinois			68,704	60,479		
Wisconsin	195	369				
Mo. and Col.	360	500	2,999	8,448	10	
Total	129,909	97,374	255,977	291,461	8,703	8,522

The following table gives the production by Pennsylvania and Ohio of Bessemer and all other grades of pig iron in 1900 and 1901:

Grades—Gross Tons.	Pennsylvania.		Ohio.	
	1900	1901	1900	1901
Bessemer and low grade phos. pig iron	4,270,800	4,885,877	1,899,663	2,637,091
Basic pig iron	790,608	1,011,260	61,966	79,477
Forge pig iron	352,557	313,740	105,780	91,922
Foundry pig iron	767,343	845,309	344,367	426,152
Malleable Bessemer	8,456	61,073	41,876	69,480
Charcoal pig iron	3,422	4,761	7,737	10,067
White and mottled and miscel.	33,044	24,542	10,432	12,236
Spiegel and ferro-manganese	135,297	191,394		
Direct castings	4,408	5,301	90	
Total	6,365,935	7,343,257	2,470,911	3,326,425

The following table gives the production by districts in Pennsylvania of Bessemer and low-phosphorus, basic and forge pig iron in 1900 and 1901:

Districts—Gross tons	Bess. and low-phos.		Basic.		Forge.	
	1900.	1901.	1900	1901	1900	1901
Lehigh Valley	129,180	123 190	73,821	86,567	108,626	44,616
Schuylkill Valley	83 204	84,220	118,376	113,482	67,550	107,558
Upper Susquehanna	137,765	80,242			1,870	
Lower Susquehanna	389,792	506,877	82,732	82,294	18,143	19 958
Juniata Valley	22,654				19,759	39,225
Allegheny Co.	2,472,673	2,897,366	446,543	568,516	49,02	
Shenango Valley	633,014	716,815	46,877	109,960	27,965	15,384
Miscellaneous coke	402,518	479,167	22,259	50,441	59,619	86,999
Total	4,270,800	4,885,877	790,608	1,011,260	352,557	314,740

Steel and Steel Castings.

We have already given the production of steel ingots and castings in 1901 as reported by the American Iron & Steel Association. The total of Bessemer ingots was 8,713,302 gross tons; of open-hearth ingots, 4,656,309 tons; of crucible and miscellaneous, 103,984 tons; making a total of 13,473,595 tons of ingots and castings, against 10,188,329 tons in 1900 and 10,639,857 tons in 1899.

The production of open-hearth steel castings in 1901 was 301,622 tons, of which 206,681 tons was acid and 94,941 tons basic. This is as against 134,847 tons of acid castings and 42,644 tons of basic castings—total, 177,491 tons—in 1900. The production of Bessemer castings in 1901 was 6,764 tons and of crucible and miscellaneous, 9,184 tons. Adding these to open-hearth castings makes a total of 317,570 tons.

Production of Structural Shapes.

The statistics of iron and steel structural shapes embrace the production of beams, beam girders, zee bars, tees, channels, angles, and other structural forms, but they do not include plate girders made from plates. Plates are provided for under other classifications, and in the general statistics of plates are included all plates cut to specifications. Nearly all the structural shapes and plates used for structural purposes are made of steel. The total production of strictly structural shapes in 1900 was 815,161 tons and in 1901 it was 1,013,150 tons. The production of structural shapes in 1900 and 1901 by States was as follows:

States—Gross Tons.	1900	1901
New York and New Jersey	34,249	51,002
Pennsylvania	759,712	925,940
Alabama and Ohio	12,344	30,508
Colorado and California	8,863	5,700
Total	8 5,161	1,013,150

The increased production of structural shapes in 1901 as compared with 1900 amounted to 197,989 gross tons, or over

24 percent. Pennsylvania made over 91 percent of the total production in 1901, New Jersey over 3 percent, and Ohio almost 3 per cent. No other State made 1.5 percent of the total production.

Production of Wire Rods.

The production of iron and steel wire rods in the United States in 1901 amounted to 1,365,934 gross tons, against 846,291 tons in 1900, 1,036,398 tons in 1899, and 1,071,683 tons in 1898, showing an increase of 519,643 tons, or over 61 percent, in 1901 as compared with 1900. Of the total production in 1901, 1,365,459 tons were steel and 475 tons were iron rods. The following table gives the production by States in the last three years:

States—Gross Tons.	1899	1900	1901
Mass., Conn., R. I., N. Y. and N. J.	139,945	134,501	176,101
Pennsylvania	319,058	240,533	386,037
Kentucky, Alabama and Ohio	312,620	244,731	402,679
Indiana and Illinois	264,775	226,525	381,117
Total	1,036,398	846,291	1,365,934

Pennsylvania made the largest quantity of wire rods in 1901, with Illinois a close second, Ohio third, and Massachusetts fourth. Seven other States, Rhode Island, Connecticut, New York, New Jersey, Kentucky, Alabama and Indiana, also rolled wire rods in 1901. With the exception of Rhode Island, which first rolled rods in 1901, all the States named also produced rods in 1900.

Production of Wire Nails.

The production of wire nails in the United States in 1901 amounted to 9,803,822 kegs of 100 pounds, as compared with 7,233,979 kegs in 1900, an increase of 2,569,843 kegs, or over 35 percent. In 1899 the production amounted to 7,618,130 kegs, in 1898 to 7,418,475 kegs, in 1897 to 8,997,245 kegs, in 1896 to 4,719,860 kegs, and in 1895 to 5,841,403 kegs. The wire nails made in 1901 were manufactured by 61 works, as compared with 56 in 1900. The production in 1901 was greatly in excess of that of any other year, exceeding by 806,577 kegs that of 1897, the year of next largest production. The following table gives the production of wire nails in 1899, 1900, and 1901, in kegs of 100 pounds:

States—Kegs of 100 Pounds.	1899	1900	1901
Massachusetts, Rhode Island and Conn.	176,877	212,584	71,553
New York	49,603	63,466	136,118
Pennsylvania	2,905,211	2,158,399	3,118,508
Md., W. Virginia, Ky., Ala., and Ohio	2,154,823	2,516,391	3,633,894
Indiana and Illinois	2,184,662	2,195,672	2,716,748
Mich., Wis., Kan., Wash., and California	146,954	87,467	127,001
Total	7,618,170	7,233,979	9,803,822

The statistics of the production of iron and steel cut nails and cut spikes do not embrace railroad and other spikes made from bar iron, wire nails of any size, or machine-made horseshoe nails. Spikes cut from plates are included with cut nails. The total production of cut nails in 1901 was 1,542,240 kegs of 100 pounds each, against 1,573,494 kegs in 1900, a decrease of 31,254 kegs, or a little less than 2 percent. In 1886 the maximum production of 8,160,973 kegs was reached. In 1901 the production of wire nails exceeded that of cut nails by 8,261,582 kegs, in 1900 by 5,660,485 kegs, in 1899 by 5,713,790 kegs, in 1898 by 5,846,254 kegs, and in 1897 by 6,890,446 kegs.

Production of Plates and Sheets.

The production of plate and sheet iron and steel in the United States in 1901, excluding nail plate, amounted to 2,254,425 gross tons, against 1,794,528 tons in 1900, an increase of 459,897 tons, or over 25 percent. Skelp iron and steel are not included in our statistics of plates and sheets but are classed with other rolled products. The following table gives the production by States of all kinds of plates and sheets in 1901:

States—Gross Tons.	1901
New England	416
New York and New Jersey	6,512
Pennsylvania	1,572,500
Delaware and Maryland	29,484
West Virgina	31,928
Kentucky and Alabama	47,503
Ohio	294,266
Indiana, Illinois, Michigan, Missouri and Colorado	271,816
Total	2,254,425

The production of "black plates for tinning" alone in 1901, which is included above, was 385,026 gross tons. Of this total Pennsylvania made over 50 percent. New Jersey, Maryland, West Virginia, Ohio, Indiana, Michigan and Missouri also make black plates for tinning in 1901.

Production of Tin Plate.

The duty on tinplates provided for in the tariff act of 1890 went into effect on July 1, 1891. The statistics of production since that date are as follows for tin and tin plates, the production of tin dipping plants being included:

	Gross Tons.		Gross Tons.
1891 (last six months)	999	1897	256,598
1892	18,803	1898	326,915
1893	55,182	1899	360,875
1894	74,260	1900	302,665
1895	113,666	1901	399,291
1896	160,362		

Production of All Rolled Iron and Steel.

In the phrase rolled iron and steel are included all iron and steel rolled into finished forms, as follows: (1) all sizes of iron and steel rails; (2) plate and sheet iron and steel; (3) iron and steel plates for cut nails and cut spikes; (4) wire rods; (5) iron and steel structural shapes; (6) bar, bolt, hoop, skelp, rolled axles, fish plates, rolled armor plate, and other rolled products. Forged armor plate, hammered axles, and other forgings are not included, nor such intermediate forms as muck bars, billets, and tinplate bars and sheet bars.

The production of all iron and steel rolled into finished forms in the United States in 1901 was 12,349,327 gross tons, against 9,487,443 tons in 1900, an increase of 2,861,884 tons, or over 30 percent. Twenty-six States rolled either iron or steel or both iron and steel in 1901. The following table gives the total production by States of rolled iron and steel in 1901, in gross tons:

States—Gross Tons.	1901.	States—Gross Tons.	1901.
Maine and Mass	165,109	Alabama	109,391
Rhode Island and Conn.	48,044	Ohio	1,566,996
New York	182,978	Indiana	399,707
New Jersey	143,367	Illinois	1,442,165
Pennsylvania	6,962,168	Michigan	103,063
Delaware	58,242	Wisconsin	181,867
Maryland	301,446	Missouri	37,182
Virginia	29,026	Colorado and Wyoming	107,980
West Virginia	201,264	Wash., Oregon and Cal.	32,152
Kentucky	156,506		
Tennessee and Georgia	30,214	Total	12,349,327

Total Production of Rolled Iron and Steel.

The total production of all kinds of iron and steel rolled into finished forms in the United States from 1887 to 1901 is given below:

Years—Gross Tons.	Iron and Steel Rails.	Bars, Hoops, Skelps and Shapes.	Wire Rods.	Plates and Sheets, Except Nail Plate.	Cut Nails—Gross Tons.	Total—Gross Tons
1887	2,139,640	2,184,279	.....	603,355	308,432	5,235,706
1888	1,403,700	2,034,161	279,769	609,827	289,891	4,617,349
1889	1,522,204	2,374,968	363,851	716,406	259,409	5,236,928
1890	1,885,397	2,518,660	457,090	809,98	251,828	6,022,875
1891	1,307,176	2,644,941	536,607	678,927	223,312	5,390,963
1892	1,351,844	3,033,439	627,829	75,460	201,232	6,165,814
1893	1,136,458	2,491,497	537,274	674,345	136,113	4,975,685
1894	1,021,772	2,185,875	673,02	682,900	108,262	4,642,211
1895	1,306,135	3,005,795	791,130	991,459	95,085	6,189,574
1896	1,22,010	2,731,932	823,986	965,776	72,137	5,515,841
1897	1,647,892	3,081,760	970,736	1,207,286	94,054	7,001,728
1898	1,981,241	3,941,957	1,071,683	1,448,301	70,188	8,513,370
1899	2,272,700	4,996,801	1,036,398	1,903,505	85,015	10,294,419
1900	2,385,682	4,390,697	846,291	1,794,528	70,245	9,487,443
1901	2,874,639	5,785,479	1,365,934	2,254,425	68,850	12,349,327

Pennsylvania made over 56 percent of the total production of rolled iron and steel in 1901, Ohio over 12 percent, Illinois over 11 percent, and Indiana over 3 percent. No other State produced 2.5 percent. Minnesota and Kansas, both of which States have rolling mills, did not produce any rolled iron or steel in 1901, but Minnesota made a small quantity of direct steel castings.

The statement of earnings of the American Screw Co. for the year ended Dec. 31, 1901, has just been issued. It shows profits of $152,109 for 1901 as compared with $113,956 in 1900 and $349,153 in 1899. President Thurston explains that the settlement of matters connected with associations which expired during the year 1900, and the refitting of a large quantity of machinery which has stood dismantled for years, called for extraordinary expenditures in 1901, which have been written off. Competition has been aggressive, forcing the ruling price of the company's products to very low levels.

THE CANADIAN IRON TRADE IN 1901.

In his annual report, just issued, General Manager Swank, of the American Iron and Steel Association, presents the following concerning the development of the Canadian iron trade in the past year:

Attention was called in our last annual report to the recent rapid development of the iron and steel industries of Canada. This development still continues. Down to 1901 it was confined chiefly to the manufacture of pig iron, the increase in the production of pig iron in 1901 over 1900 amounting to 158,886 gross tons, or over 184 per cent. But in 1901 a great impetus was given to the manufacture in Canada of Bessemer and open hearth steel and of rolled iron and steel products.

Canada has just practically completed and put in operation two large steel plants, one at Sydney, Cape Breton, Nova Scotia, for the manufacture of open-hearth steel, and one at Sault Ste. Marie, in the Algoma district, in the Province of Ontario, for the manufacture of Bessemer steel. The former is owned by the Dominion Iron and Steel Co., Ltd., and the latter by the Algoma Steel Co., Ltd. The open-hearth plant made its first steel on Dec. 31, 1901. It is equipped with ten 50-gross-ton Campbell tilting furnaces, (3 acid and 7 basic,) and has an annual capacity of 425,000 gross tons of ingots, which are rolled into blooms, billets, and slabs, of which 400,000 tons can be annually produced. The Bessemer steel plant is equipped with two 6-gross-ton acid converters, which have an annual capacity of 200,000 tons of ingots. Steel was first made on Feb. 18, 1902, Canadian pig iron being used. The company's rolling mill is expected to turn out annually about 180,000 tons of steel rails and structural shapes. Its first rail was rolled on May 5, 1902.

The open-hearth plant at Sydney has connected with it four modern blast furnaces, their combined annual capacity amounting to 500,000 gross tons of pig iron. All these furnaces have been blown in. The Bessemer plant at Sault Ste. Marie is to have four blast furnaces, two of which the company expects to put in blast in the near future and two in the coming fall. The estimated annual capacity of these four furnaces is 380,000 gross tons.. Two of the furnaces will use coke and two will use charcoal.

In addition to the plants named above the Cramp Steel Co., Ltd., is now erecting works at Collingwood, Ont., for the production of Bessemer and open-hearth steel and rolled iron and steel. The Bessemer department is to be equipped with two 5-gross-ton acid converters, with an annual capacity of 100,000 tons of ingots, and the open-hearth department with two 15-gross-ton furnaces (one acid and one basic,) with an annual capacity of 30,000 tons of ingots. The rolling mill will be equipped for the manufacture of rails, structural shapes, bar iron, shafting, etc., for which it will have an annual capacity of about 200,000 tons. The erection of two coke blast furnaces, each with a daily capacity of 250 tons of pig iron, is contemplated by this company.

The Nova Scotia Steel and Coal Co., Ltd., of New Glasgow, Nova Scotia, broke ground in April, 1902, at Sydney, Cape Breton, for the foundations for two coke furnaces. The company now operates a blast furnace at Ferrona and a rolling mill and open-hearth steel plant at New Glasgow, both in Nova Scotia.

Production of Pig Iron.

The production of pig iron in Canada, as ascertained from the manufacturers by the American Iron and Steel Association, amounted in the calendar year 1901 to 244,976 gross tons, against 86,090 tons in 1900, an increase of 158,886 tons, or over 184 per cent. Of the production in 1901, 228,893 tons were made with coke and 16,083 tons with charcoal. The production of Bessemer pig iron, included above, amounted to 29,577 tons. Neither spiegeleisen nor ferro-manganese was made. The production of pig iron in Canada from 1894 to 1901 is given in the following table. The statistics of the association do not go back of 1894.

Years.	Gross tons.	Years.	Gross tons.	Years.	Gross tons.
1894.....	41,791	1897.....	13,796	1900.....	86,090
1895.....	37,829	1898.....	68 755	1901.....	244,976
1896.....	60,0_0	1899.....	94,077	.....	.....

On December 31, 1901, the unsold stocks of pig iron in Canada amounted to 59,472 gross tons, as compared with 12,465 tons at the close of 1900 and 9,932 tons at the close of 1899. Of the unsold pig iron on hand on December 31, 1901, 54,563 tons were coke pig iron and 4,909 tons were charcoal pig iron.

Production of Steel.

The total production of steel in Canada in 1901 was 26,084 tons, against 23,577 tons in 1900, an increase of 2,507 tons. Both Bessemer and open-hearth steel ingots and castings were made in 1900 and 1901. Of the total production of open-hearth steel in 1901 less than one-fourth was made by the acid process.

The following table gives the production of all kinds of steel ingots and castings in Canada from 1895 to 1901, in gross tons:

Years.	Gross tons.	Years.	Gross tons.	Years.	Gross tons.
1894.....	25,685	1897.....	18,400	1900.....	23,577
1895.....	17,000	1898.....	21 540	1901.....	26,084
1896.....	16,800	1899.....	22,000	.....	.....

Production of Rolled Iron and Steel.

The production of open-hearth steel rails in 1901 amounted to 891 gross tons, against 700 tons in 1900; structural shapes, 4,388 tons, against 4,674 tons in 1900; cut nails made by rolling mills and steel works having cut-nail factories connected with their plants, 126,891 kegs of 100 pounds, against 117,186 kegs in 1900; plates and sheets, 2,857 tons, against 2,100 tons in 1900; all other rolled products, excluding muck and scrap bars, blooms, billets, sheet bars, etc., 98,206 tons, against 87,984 tons in 1900. Changing the cut-nail production to gross tons, the total quantity of all kinds of iron and steel rolled into finished products in 1901 amounted to 112,007 tons, against 100,690 tons in 1900. The following table gives the production of all kinds of rolled iron and steel in finished forms in Canada from 1895 to 1901:

Years.	Gross tons	Years.	Gross tons.	Years.	Gross tons.
1895.....	66,401	1898.....	90 303	1901.....	112,007
1896.....	75,043	1899.....	110,642	.....	.....
1897.....	77,021	1900.....	100,690	.....	.....

Summary of Canadian Iron and Steel Works in 1901.

On Dec. 31, 1901, there were 14 completed furnaces in Canada and four other furnaces were in course of erection—two charcoal and two coke. In addition four furnaces were projected. Of the completed furnaces, seven were in blast and seven were idle. During 1899-1901, four furnaces were erected by the Dominion Iron & Steel Co. at Sydney, three of which were blown in in 1901. The fourth furnace was put in blast in January, 1902. Of the 14 completed furnaces, nine were equipped to use coke, four to use charcoal, and one to use charcoal and coke. The annual capacity of the 18 built or building furnaces on Dec. 31, 1901, was 1,090,300 tons, of which 958,000 tons are credited to 11 coke furnaces.

On Dec. 31, 1901, there were 18 completed rolling mills and steel works in Canada and two were building. Of these one was equipped for the manufacture of steel in a special Bessemer converter, one to make Tropenas steel, and two standard Bessemer steel plants were being built, and four plants were equipped for the manufacture of open-hearth steel and one open-hearth steel plant was being built. The annual capacity of the built and building plants was 838,400 tons of steel and 981,900 tons of rolled products.

Canadian Bounties on Iron and Steel.

As we have heretofore explained, the recent rapid development of the iron and steel industries in Canada has been greatly promoted by the action of the Dominion Parliament in enacting the bounty act of June 29, 1897. But the bounty system had previously been in force in Canada. In 1883 the Dominion Parliament authorized the payment of a bounty of $1.50 a ton upon all pig iron manufactured in Canada. This bounty was continued until July 1, 1889, when the rate was made $1 a ton. A further change was made on July 1, 1892, when the rate was increased to $2 a ton until July 1, 1897, and in 1894 additional legislation provided for the payment of a bounty of $2 a ton on puddled bars and on steel billets.

The act of 1897, most fruitful of all, provided for the payment of $3 per ton "on steel ingots manufactured from in-

gredients of which not less than 50 per cent of the weight thereof consists of pig iron made in Canada;" $3 per ton "on puddled iron bars manufactured from pig iron made in Canada;" $3 per ton "on pig iron on the proportion produced from Canadian ore;" and $2 per ton "on pig iron on the proportion produced from foreign ore." These bounties have been extended to June 30, 1907, provided, however, that they shall be annually reduced after April 23, 1902, as follows: from that date to June 30, 1903, 90 percent shall be paid; from July 1, 1903, to June 30, 1904, 75 percent; from July 1, 1904, to June 30, 1905, 55 percent; from July 1, 1905, to June 30, 1906, 35 percent; from July 1, 1906, to June 30, 1907, 20 percent.

Down to June 30, 1901, there had been paid in iron and steel bounties under the foregoing acts a total of $2,168,435. In addition to these payments the Province of Ontario has paid since 1894 a bounty of $1 a ton on all pig iron made in the province from iron ore mined in Ontario. Down to Oct. 31, 1901, there had been paid under this legislation $59,741.

Amounts Paid in Bounties.

The following details of the payments of bounty by the Dominion government from 1884 to 1901 are reprinted in the current issue of the *Bulletin* from the "Statistical Year Book of Canada for 1901":

Fiscal Year.	Amount.	Bounty Paid Per Ton.	Fiscal Year.	Amount.	Bounty Paid Per Ton.
1884.....	$44,090	$1 50	1893.....	$ 93,896	$2 00
1885.....	38,635	1 50	1894.....	121,044	2 00
1886.....	39,470	1 50	1895.....	63,384	2 00
1887.....	59,576	1 50	1896.....	104,105	2 00
1888.....	33,314	1 50	1897.....	66,409	2 00
1889.....	37,234	1 50	1898.....	165 654	*
1890.....	25 697	1 00	1899.....	187,954	*
1891.....	20,153	1 00	1900.....	238,295	*
1892.....	30 294	1 00	1901.....	351,219	*

*$3 per ton on pig iron made from Canadian ore and $2 per ton on pig iron made from foreign ore.

The following is a statement of the quantities and amount of bounty paid on steel ingots, steel billets, and puddled bars, 1896-1901:

Year Ended 30th June.	Steel Ingots.		Steel Billets.		Puddled Bars.	
	Quantity.	Bounty Paid.	Quantity.	Bounty Paid.	Quantity.	Bounty Paid.
	Tons.		*Tons.*		*Tons*	
1896.....	.....	.....	29,749	$59,498	2,806	$ 5,611
1897.....	.....	.....	8,683	17,366	1 509	3,019
1898.....	18,137	$ 54,412	*4,912	*13,042	2,615	7 706
1899.....	24,881	74 644	†	†	5,837	17,511
1900.....	21,453	64,360	†	†	3.374	10,121
1901.....	33.352	100 058	†	†	5.568	16,703

*Manufactured in 1896-7 and paid for in 1897-8.
†No bounty paid on steel billets after 30th June, 1897.

PERSONAL.

The iron trade of Cleveland is just now well represented among foreign travelers. Leonard C. Hanna, of M. A. Hanna & Co., has gone to Switzerland to remain for several months. E. W. Oglebay, of Oglebay, Norton & Co., and H. G. Dalton, of Pickands, Mather & Co., have been in Europe for some time and will return next month. W. C. Runyon, of Runyon, Stubbs & Co., and the Struthers Furnace Co., is in England. J. B. Stubbs, of the same house, landed at San Francisco last week on his return from Japan.

J. D. Gilchrist, who had charge of the Oliver Iron Mining Company's operations on the Mesabi range, and who resigned to accept the superintendency of the Colorado Fuel & Iron Co.'s mines in Wyoming, has been appointed general manager of all the mining properties controlled by that corporation.

Robert Hoesch, who is connected with Eisen und Stahlwerk Hoesch, at Dortmund, Germany, is in the United States for a stay of six months in which he will visit iron and steel works in the various districts and study methods of manufacture.

Joseph Garretson, of Cincinnati, formerly city editor of the *Times-Star*, has been elected secretary of the National Metal Trades Association. Under the ruling of the administrative council the duties of the commissioner and the secretary will hereafter be divided. E. F. Du Brul continues as acting commissioner.

S. T. Wellman, of the Wellman-Seaver-Morgan Engineering Co., Cleveland, expects to sail for Europe early next month.

A Maitland, general manager of the Republic Iron & Steel Co.'s iron mines, has announced himself as a candidate for the Republican nomination for lieutenant governor of Michigan.

Joseph Wharton has announced his intention to add $350,000 to his previous endowment of the Wharton School of Finance and Economy of the University of Pennsylvania, making his total contribution to this school $500,000. The school was founded by Mr. Wharton in 1881.

J. M. Butler has resigned as secretary of the Inland Steel Co., of Chicago.

Frank A. Lapham has resigned his position as general sales agent of the Tennessee Coal, Iron & Railway Co. to accept a position as general sales agent of the Lackawanna Steel Co., with headquarters at 100 Broadway, New York. He assumes his new duties on July 1.

Frank A. Burr, who has been connected with the New York sales office of the Pennsylvania Steel Co., has resigned to become general sales agent of the Tennessee Coal, Iron & Railway Co. at New York.

Victor E. Edwards, mechanical engineer of the Morgan Construction Co., Worcester, Mass., sails for Europe this month.

M. E. Johnson, formerly assistant manager of the fence department of the American Steel & Wire Co. New York office, has been elected general manager of the United States Wire & Nail Co. at Pittsburg.

President George G. McNurty, of the American Sheet Steel Co., has taken three ministers from Vandegrift, Pa., as his guests on a trip to Europe.

Frank H. Buhl, of Sharon, O., is reported to be interested with P. L. Kimberly in the Northern Coal & Coke Co., which has 100,000 acres of coal lands in Kentucky. The coal deposits of these properties are reported to be exceptionally rich and extensive coking operations will probably be carried on.

Charles R. Roof has resigned as superintendent of the Youngstown Manufacturing Co., Youngstown, O. He is now engaged in the organization of a plant to manufacture nuts and bolts and it is probable that the company will be capitalized at $200,000.

At a meeting of the directors of the American Screw Co., Providence, R. I., Samuel M. Nicholson was elected president to succeed Clark Thurston who resigned recently. Mr. Nicholson is also president of the Nicholson File Co.

Hugh Kennedy, manager of the furnace department of the American Steel Hoop Co. with headquarters at Pittsburg, will resign shortly to become general manager of the Buffalo-Susquehanna Iron Co., recently organized at Buffalo, N. Y. Mr. Kennedy has had about 25 years experience in blast furnace practice, having had charge of the furnaces of the American Steel Hoop Co. for the past two years. Prior to that time he was manager of the Isabella furnace for many years.

Attorney James Kennedy, of Youngstown, O., a brother of Hugh, Julian and Walter Kennedy who are so widely known in the iron and steel trade, is a candidate for the Republican nomination for congress in his district.

Annual Report of the American Iron and Steel Association.

Another of the excellent statistical reports for which the office of the American Iron and Steel Association has made a unique reputation, has just been issued—the annual report for 1901. It has a number of valuable features not found in its predecessors. The tables relating to pig iron production are much fuller than heretofore and now give the production by grades. The monthly prices of steel bars at Pittsburg in the past six years are also added, with monthly prices of tin plates in the same period, and details of the per capita consumption of pig iron in the United States in the decennial periods from 1850 to 1901. Special attention is given also to the development of the iron and steel industry of Canada under the bounty system, this growth in the past two years being noteworthy. The report contains 64 pages, and in typography is up to the high standard of the association's publications. General Manager Swank succeeds in making each year's publication the best of all. The price of the report is $3.

Boston Convention of the American Foundrymen's Association.

In our last issue we gave an account of the opening session of the American Foundrymen's Association at Boston, June 17-19. The attendance grew with each day, and more than 250 members and guests representing all sections of the United States and Canada were enrolled, in addition to the ladies. The latter, of whom there were about 100 present, have cause to remember the hospitality of Boston, special entertainment being provided for them each day by the local committee. The social features of the meeting were unusually elaborate. The local foundrymen had organized most thoroughly for the excursions, the theater party, the luncheons and other features of entertainment and their efforts received the warmest appreciation from the visitors. In addition to those mentioned in these columns last week the following were in attendance:

A. E. Martin, Pedrick & Ayer Co., Philadelphia.
E. J. Lambert, Syracuse Chill Plow Co., Syracuse, N. Y.
F. L. Bromley, Detroit Foundry & Mfg. Co., Detroit, Mich.
F. H. Ellis, Barbour-Stockwell Co., Cambridge, Mass.
Samuel M. Thompson, Barbour-Stockwell Co., Cambridge.
R. C. Bird, Broadway Iron Foundry Co., Cambridge, Mass.
R. F. Flinterman, F. A. Flather, Chicago.
J. F. Lanigan, Davis Foundry Co., Lawrence, Mass.
E. E. Durant, G. F. Warner Mfg. Co., New Haven, Conn.
C. F. Belcher, Walker & Pratt Mfg. Co., Malden, Mass.
Eugene R. Pommer, United States Navy, Boston.
Harry Oldfield, Watertown Arsenal, Watertown, Mass.
Richard H. Penney, Barbour-Stockwell Co., Cambridge.
Harry Gibby, Condor Iron Foundry Co., East Boston.
W. M. Fitzpatrick, S. Obermayer Co., Pittsburg.
Edgar W. Anthony, Smith & Anthony Co., Boston.
Henry A. Pridmore, Pridmore Molding Machine Co., Chicago.
Walter C. English, *Iron Age*, Boston.
Wallace C. Griffith, Watertown, Mass.
Clarence H. Joslin, Merrimac Iron Foundry, Lawrence, Mass.
J. W. Littlefield, Hub Wire Works, Boston.
Hugh W. Adams, New York.
James C. Alley, C. L. Peirson, New York.
R. W. Page, C. L. Peirson, New York.
William J. Breen, Hugh W. Adams, Boston.
Thos. O'Halloran, International Power Co., Providence, R. I.
L. Renick, Jr., Michigan Drug Co., Detroit, Mich.
Frank L. Codman, F. L. & J. C. Codman, Boston.
John C. Codman, F. L. & J. C. Codman, Boston.
A. W. Slocum, Keystone Car Wheel Co., Pittsburg.
J. P. Pero, Malleable Iron Fittings Co., Branford, Conn.
N. S. Hart, F. L. & J. C. Codman, Boston.
F. H. Stevens, Somerville, Mass.
John McLaren, Phillips & McLaren, Pittsburg.
S. H. Stupakoff, Fullman Co., Pittsburg.
J. S. Seaman, Seaman-Sleeth Co., Pittsburg.
Charles B. Seaman, Seaman-Sleeth Co., Pittsburg.
E. J. Lyon, Brown & Sharpe Mfg. Co., Providence, R. I.
A. E. D'Orsay, General Electric Co., Lynn, Mass.
James A. Kirby, Brown Bros. Mfg. Co., Chicago.
J. J. Burgen, Lane Mfg. Co., Montpelier, Vt.
Charles Bailey, Reliance Steel Castings Co., Pittsburg.
G. W. Knotts, United Engineering & Foundry Co., Pittsburg.
S. A. McRoberts, *American Manufacturer*, Pittsburg.
James A. Murphy, Erie, Pa.
D. J. Thomas, Sterret & Thomas Foundry, Pittsburg.
L. M. Jenkins, Pittsburg.
S. D. Sleeth, Westinghouse Air Brake Co., Pittsburg.
C. F. English, *Iron Age*, Boston.
F. E. Gordon, Ohio Sand Co., Conneaut, O.
Wm. Yagle, Wm. Yagle Co., Ltd., Pittsburg.
F. D. Stevens, Walker & Pratt Mfg. Co., Boston.
A. J. Miller, Jr., Whitehead Bros. Co., Providence, R. I.
Arthur E. Shields, Shields Foundry Co., Mansfield, Mass.
James H. Doyle, Boston.
Wm. W. Lobdell, Lobdell Car Wheel Co., Wilmington, Del.
Albert J. Meyer, Abram Cox Stove Co., Philadelphia, Pa.
Josiah Thompson, J. Thompson & Co., Philadelphia, Pa.
E. B. Pierce, Wheeler's Foundry Co., Worcester, Mass.
Henry Wright, Buckeye Malleable Iron Co., Columbus, O.
George B. Buckingham, Arcade Malleable Iron Co., Worcester, Mass.
F. H. Zimmers, Union Foundry & Machine Co., Pittsburg.
F. H. Zimmers, Jr., Union Foundry & Machine Co., Pittsburg.
Thomas J. Rankin, Abram Cox Stove Co., Philadelphia, Pa.
J. S. McCormick, J. S. McCormick Co., Pittsburg.
E. G. Whitney, Kidder Press Co., Dover, N. H.
E. B. Cook, Warwick Iron & Steel Co., Pottstown, Pa.
A. L. Nash, Dalton Nash Co., New York.
W. S. White, J. S. White Co., Pawtucket, R. I.
Thomas D. West, Thos. D. West Foundry Co., Sharpsville, Pa.
Robert P. Cunningham, Deane Steam Pump Co., Holyoke, Mass.
G. A. Reed, Reed & Son, Gloucester, Mass.
Chas. S. Newcomb, Deane Steam Pump Co., Holyoke, Mass.
A. L. Hassis, Dixon Crucible Co., Jersey City, N. J.
Chas. B. Moore, International Steam Pump Co., Boston.
Allen M. Pierce, International Steam Pump Co., Boston.
Jacksonville Bartley, Dixon Crucible Co., Jersey City, N. J.
W. D. Trabue, Phillips & Buttorll Mfg. Co., Nashville, Tenn.
S. A. Baird, Pilling & Crane, Philadelphia.
Edward H. Schwartz, Hawley Down-Draft Furnace Co., Chicago.
C. H. Fisher, Blanchard & Fisher, Boston.
William C. Doherty, Doherty Bros., Lowell, Mass.
Richard Denbigh, Hay Foundry & Iron Works, Newark, N. J.
G. H. Carson, Mechanics Iron Foundry, Boston.
Frank Thompson, T. P. Kelley & Co., New York.
C. H. Stevens, Somerville, Mass.
H. E. Wetherbee, Jas. Hunter Machine Co., No. Adams, Mass.
Arthur L. Rice, *The Engineer*, Cleveland.
Henry M. Lane, M. E., School of Mechanical Engineers, Scranton, Pa.
E. H. Colvin, Colvin Foundry Co., Providence, R. I.
Chas. A. Coleman, O. D. Thomas, Taunton, Mass.
L. D. Gilbert, Frick Co., Waynesboro, Pa.
Edward Robinson, Wellslight Mfg. Co., New York.
Andrew McKee, Hawley Down-Draft Furnace Co., New York.
H. W. Bullard, Poughkeepsie Foundry & Machine Co., Poughkeepsie, N. Y.
Eli Millett, Millett Core Oven Co., Springfield, Mass.
H. N. Belleville, Millett, Core Oven Co., Springfield, Mass.
Enrique Touceda, Albany, N. Y.
Stanley G. Flagg, Stanley G. Flagg Co., Philadelphia.
F. C. Brooksbank, E. T. Warden & Sons, Philadelphia.
John Warden, E. T. Warden & Sons, Boston.
Charles A. G. Winther, Chapman Valve Mfg. Co., Indian Orchard, Mass.
C. D. Shepard, Wm. M. Crane Co., Peekskill, N. Y.
J. E. Plimpton, J. Plimpton Co., Norwood, Mass.
F. W. Stickle, B. F. Sturtevant Co., Boston.
Ben Gomersall, Mechanics Foundry & Machine Co., Fall River, Mass.
J. F. Blauvelt, New England Butt Co., Providence, R. I.
J. G. Aldrich, New England Butt Co., Providence, R. I.
C. H. Bird, H. H. Adams, New York.
Charles T. Cottrell, C. B. Cottrell & Sons Co., Westerly, R. I.
R. A. Mason, C. B. Cottrell & Sons Co., Westerly, R. I.
E. E. Whippen, C. B. Cottrell & Sons Co., Westerly, R. I.
R. W. Marble, Clyde Iron Works, Duluth, Minn.
Patrick Shields, Shields Foundry Co., Mansfield, Mass.
George C. Shields, Shields Foundry Co., Mansfield, Mass.
Richard Carroll, Carroll Foundry Co., Houghton, Mass.
H. B. Buckingham, Arcade Malleable Iron Co., Worcester, Mass.
George H. Conant, W. Somerville, Mass.
A. J. Miller, Whitehead Bros. Co., Providence, R. I.
George W. Briggs, Lamb Knitting Machine Co., Chicopee Falls, Mass.
Victor Swenson, Condor Iron Foundry Co., East Boston.
Robert Gilchrist, Rogers Brown & Co., New York, N. Y.
Joel M. Bense, Kingsley Iron & Machine Co., Canton, Mass.
W. F. Thatcher, Florence Iron Works, Florence, N. J.
W. H. Larrison, R. D. Wood & Co., Florence, N. J.
S. M. Rodgers, American Steel & Wire Co., Worcester, Mass.
Thomas I. Rankin, Jr., Philadelphia, Pa.
N. C. Kinsbury, Boston Testing Laboratory, Boston.
E. P. Osgood, Osgood & Witherly, Boston.
Walter M. Saunders, A. Carpenter & Sons Foundry Co., Providence, R. I.
C. D. Newcomb, Jr., Holyoke, Mass.
Albert Sauveur, Boston Testing Laboratory, Boston.
F. J. Herrick, Boston Testing Laboratory, Boston.
Walter M. Wood, Manning, Maxwell & Moore, Boston.
L. Foster Davis, West Indies.
H. A. Cunba, West Indies.
E. C. Stokes, *Domestic Engineering*, Boston.
Richard Reed, H. B. Smith Co., Westfield, Mass.
Chas. Mills, Saco & Pettee Machine Shops, Newton Upper Falls, Mass.
Wm. H. Baush, Baush Machine Tool Co., Springfield, Mass.
Henning Borgstedt, De La Verna Refrigerating Co., New York.
W. A. Garrett, Whiting Foundry & Equipment Co., Boston.
F. W. Richardson, Barbour-Stockwell Co., Cambridge, Mass.
M. W. Alexander, General Electric Co., Lynn, Mass.
C. Hitch, Jr., American Tool & Machine Co., Hyde Park, Mass.
Chas. R. Earle, Phœnix Iron Foundry, Providence, R. I.
Eddy Richards, C. S. Bell Co., Hillsboro, O.

C. C. Hodges, Walker & Pratt Mfg. Co., Watertown, Mass.
John Needham, Boston, Mass.
H. W. Thomas, O. G. Thomas, Taunton, Mass.
O. G. Thomas, O. G. Thomas, Taunton, Mass.
H. F. Livermore, Boston, Mass.
J. Hayes, Hayes Foundry Co., Lynn, Mass.
C. L. Lanigan, Davis Foundry Co., Lawrence, Mass.
Philip J. McGrath, West Somerville, Mass.
E. W. Woodley, West Somerville, Mass.

The Secretary's Report.

At the opening session of Tuesday morning the report of the secretary, Dr. Moldenke, was presented. It covers a year of marked progress in the work of the association. The secretary has produced in the *Journal* a publication of which the membership can well feel proud, and in order that the organization might be put on a sound financial basis has given his time and his effort practically without compensation. The report is as follows:

Another prosperous year has been given to us, wherein to consolidate our resources, improve our plants, and plan new developments in our ever increasing industry. The difficulties encountered lay in getting material rather than orders, all foundries abreast of the times making money. As the foundry industry consumed over three and one-half millions of tons of pig iron, besides the proportionate amount of scrap, in the last fiscal year, and iron has averaged at least $15 a ton, during that time, there is little wonder that with such enormous sums involved, and these distributed into every nook and corner of this great land, the foundry industry is looked upon as a good barometer of the general business conditions of the nation. With indications pointing to a still further advance in pig iron through increased consumption, many of our foundrymen are contracting for next year's delivery, and fortunate are those who have covered their this year's requirements at fair prices.

Our association seems to have experienced a similar change to a more prosperous condition, the latter half of the fiscal year just closed, indicating an interest so marked that our members have every reason to be proud of the standing being acquired by it in one of the numerous lines of the industrial development of the world. There is an unusual amount of interest manifested in the study of cast iron. Those industries into which large quantities of castings enter, making close enquiries about their quality. The molder's art is beginning to be recognized as one which is most intricate and important, and there is a general inclination to place the molder himself upon the plane of a highly skilled workman who should not waste his time and his employer's money by performing unskilled labor.

Perhaps the close economies effected in the steel industry by utilizing the highest skill obtainable, or in other words, by paying for brains well directed, has left an impress on our own methods, for we also are beginning to demand the greatest production at the lowest cost, and are furnishing the best of facilities and paying the best of wages to do it.

There have been many changes in the membership of our association. Death has reaped a harvest, and removed many men most useful to our industry. The sad and tragic death of our worthy president, Mr. John G. Sadlier, was, perhaps, that least expected by us all. Hale and hearty while at our last convention, full of the fire of life while discussing the molder of the future upon the floor of the house; honored by founder and molder alike, he fell by the bullet of one of the very artisans he had helped to make. Appropriate action was taken at the time by our executive board, engrossed resolutions expressing the profound sorrow of our members for the man they had honored with the presidency, were conveyed to his bereaved family. The general wave of sympathy, finding its expression even in Europe, showed that his efforts to better the standing of the foundry, as well as uplift the men employed in it, were thoroughly appreciated.

In spite of the deaths, resignations, removals from the list, and consolidations, we can record a net increase of 17 names, making the total membership 314. The tide turned during the last few months of the year just closed, and was aided by the addition of members from England, Scotland, Wales, Germany and Holland. Inquiries from Denmark, Russia, South Africa, and even India, may result in extending the usefulness of our Association into those fields, and go to show that the world is taking note of American foundry practice, and is presumably wondering how we can afford to be so liberal with our information.

During his recent travels in Europe, your secretary met with many of the foremost directors of industries, state officials, financiers and scientists, and nearly everyone exhibited the liveliest interest in American methods of procedure, in our national resources and transportation facilities, and in our declared national policy. There were a few who affected to look down upon us with the scorn bred of centuries of industrial security, but who will none the less live to rave at the "American peril" when we cut into their holdings. Everywhere cast iron was the topic of general interest. Your secretary, whom you so kindly accredited to represent our association abroad, found it well known everywhere through its work, even if he did have to translate its name into several langauges to enable the enquirers to watch specially for the proceedings in the technical press of their respective countries.

At the Buda-Pest congress of the International Association for Testing Materials, the study of cast iron was ably urged by the only three American members present, and each of the three is directly interested in a foundry. The result was the making of tests on cast iron a special feature of the work mapped out, and much will doubtless be learned by the associated effort of the many nations interested. Our own American Society for Testing Materials, of which we are members, in its convention last week, devoted one entire session to reports on, and the discussion of, cast iron. The committee appointed by them to codify the matter of specifications will doubtless utilize those adopted by us last year to the best possible advantage.

On looking over the work of the association for the past year, you will have noticed that it was very much in line with progress. The fact that we are nearly all foundrymen, and therefore with interests to conserve, has not prevented us from urging better methods to obtain better results. We are more interested in furnishing our customers with the best of castings than they may be willing to give us credit for, as we have to hold a field which the requirements of the times is making more and more difficult to care for. Our national economy will not long tolerate the production of great weights of inferior cast iron when comparatively light steel castings will do at least as well. The watchword is now to put the best of material into the best made castings, in great quantities and at extremely low costs. There is little wonder that the excellent papers on the molding machine now being published in our *Journal* are attracting wide attention. We hope they may be extended a long time yet, and be made most exhaustive, so that a foundation may be laid upon which even future generations may build. We have also to thank the technical press, as well as the great engineering associations for the interest taken in our efforts for foundry betterment, in which they have given us substantial aid.

Your secretary begs to report further that the change of time provided for the payment of the annual dues has been effected. While this has cut off one-third of the income of the association for the year, yet it has placed our finances on a sound footing, no advance dues being now taken to pay bills in arrears. The association will therefore hereafter pay as it goes, and can regulate its expenses properly. The fact that there were no outlays whatever incurred by the association during the absence of the secretary in Europe, helped to tide over matters, and it is hoped did no injury to our members. The financial statement will be found in the report of the treasurer. Briefly summarized the figures are as follows: Total income for the year, $2,353.98; total expense, $2,352.62; leaving a balance of $1.36 in the treasury; no bills outstanding; the association free from debt, and with as bright a future ahead as the members wish to make it by the extent of their substantial support. This excellent showing is, however, in a great measure due to the work of the Standardizing Bureau, the profits of which went into the treasury. Our special thanks are due Mr. West for the disinterested manner in which he has devoted time and money in the furtherance of a work now everywhere recognized as of great value to the foundry and the steel industries.

From the item of $250 for postage, it will be noted that the office work of the secretary has been nearly doubled, but the good results have well repaid the additional effort this caused.

There has been a great call for back numbers of the *Journal*, especially by the libraries of our universities, the government, the public foundations and foreign sources. The supply is getting limited, and some of the pamphlets which were printed in two editions are already exhausted. Our *Journal* has been enlarged and only a press of other duties prevented it from taking an even more extended shape.

Our institutions of learning have not been idle in the matter of devoting time to the study of foundry problems. Besides a large correspondence with the professors most interested, your secretary, as well as our Mr. West, have recently addressed the students of several of our largest universities on foundry matters.

There are two further subjects to which our association might do well to give a substantial encouragement. The study of the electrical properties of cast iron, in conjunction with Purdue University, was reported to you last year, but not acted upon further on account of lack of funds. Then American support is most urgently needed by the Sidero-Chemical Laboratory established in Switzerland, for international research in the very lines which will be of the utmost value for the standardization of methods of the laboratory. Should we get into the position that something can be done for these matters a substantial impetus for foundry progress will result in at least those immediate lines.

The work of the various committees has been assisted as far as possible by your secretary, who in conclusion wishes to thank the many members of the association for the kind expressions of appreciation extended, the earnest help given, and the faith in the aims and ideals of our co-operative effort held forth, all of which has made him feel that the good will of the whole iron industry is with us in our chosen work.

Standardizing Bureau—Grading by Analysis.

The report of the committee on Standardizing Bureau was presented by Thos. D. West, its chairman. It was adopted by the convention and a vote of thanks was given for the excellent work the committee has done, the committee being continued for another year. The report is as follows:

"Your committee begs to report that the sales of the association's standardized drillings continue as large as during the last three years, and that this work is becoming of constantly greater importance as shown by a very much wider distribution. Not only are the blast furnaces and laboratories dealing with cast iron utilizing our drillings for their daily standards, but where disputes arise concerning the accuracy of individual work, our standards are sent for to settle them. Thus the purpose for which the bureau was originally created has been fully accomplished, and the iron industry has acquired a very material help toward a better basis for the daily routine. During the past year a second lot of sample D has been made. We can also state that the bureau is now in position to furnish the trade single bottles of samples A, B, C and D, to cover those cases where the sets of three or four bottles, which sell for $5 and $6.66 respectively, are not desired. The drillings can be obtained by addressing the chairman.

"Through the efforts of one member of our committee a substantial reduction in the cost of analytical work has been secured for the trade, and this from two reliable laboratories in Pittsburg and Cleveland. Silicon, sulphur, phosphorus and manganese determinations at 40 cents each; and the carbons in iron, and sulphur, carbon, and ash in coke at 70 cents, are the quotations made, with rebates on a sliding scale where two or more determinations per day come from the same firm. The addresses and other information can be obtained from the chairman. The accounts of the bureau up to date of June 1st, are as follows: Collections for the fiscal year, $352.87; expenses, 97.83. Balance turned over to A. F. A. treasurer, $255.04, or $642.34 in all, since the establishment of the bureau."

The report of the committee on the grading of pig iron by analysis was also presented by Mr. West as follows, being signed by himself and Dr. Moldenke:

"Your committee begs to report that in view of the developments brought out during the discussion of this matter at the last convention, a very evident leaning being manifested toward the purchase of pig iron, simply by its analysis, irrespective of the question of grading by fracture, particular pains have been taken to inquire as to the extent to which this is actually the case in present foundry practice.

"It was found that with the exception of the jobbing founder practically every one else is now specifying the composition of the iron he buys, or else is particular to find out what he does get. For these founders, who consume about three-fourths of the pig iron sold to foundries, the labors of your committee would be superfluous. For the jobbers, however, who are in the great majority, so far as isolated small shops are concerned, much good could be done, and doubtless has been by the agitation the subject has received. Unfortunately we must report that there is no interest to be observed from that direction, very few of the several thousand jobbing foundries being members of our association, or interesting themselves in the elevation of their trade. These foundries will continue to buy their No. 1 and 2 irons by fracture, irrespective of what they really get, will have their little troubles and get over them as heretofore, and receive the leavings of the founder who buys by chemical specification, and sees that he gets what he wants. Your committee does not see that it can be of any use here either, for the present, beyond agitating for closer lines on the composition of the different numbers now in the market, a work which it believes is quietly going on.

"Since the feeling in our association seems to be in the direction of exact methods of buying iron, the majority of founders, not members of our association, do not appear to be interested, we would suggest that our committee be discharged."

The report occasioned some discussion. Mr. C. S. Bell was not pleased with the reflections on the jobbing foundrymen contained in this report. He stated that owing to the large amount of different kinds of work a jobbing foundry is called upon to do it is almost impossible to adopt advanced methods and purchase the required kinds of iron by chemical analysis. As a rule, he added, the jobbing foundries are of the old style and the foundrymen are so accustomed to buying their iron for the various purposes by fracture that it is very hard to fool them with an iron unsuited for a certain purpose. Furthermore, in his opinion, it will be a long time before the jobbing foundries will purchase iron by analysis, for the reason that they seem now to get the iron best adapted to their different purposes and it will be a difficult matter to get them to use the various grades of iron in a scientific way. Dr. Moldenke replied that all the jobbing foundries that are progressive are in favor of the grading of pig iron by analysis, while the unprogressive foundries are not. Mr. T. J. Best said that in Canada there are many small jobbing foundries that do not care about advanced methods in operating their foundry or purchasing their iron. He added that they seem to get the iron that is suited to the purpose and are not interested in any of the advanced scientific methods. The committee was thanked for its work and was discharged.

Foundry Trade School.

The report of the committee on foundry trade school was presented. The Buffalo meeting in constituting the committee asked it to work for the establishment of a school in which foundry apprentices could be given the best practical and technical training for their trade, this training to fit them to bear eventually the responsibilities of master mechanics and managers. The concluding portion of the committee's very brief report says: "It is the opinion of your committee that such an institution is badly needed, and that the day is not far distant when its importance will be disagreeably forced upon the trade. It will not do to sit by idly and be compelled to meet the issue. Far better to act at once. This is a movement, to be most successful, which should have the support of our foundrymen as well as the technical bodies interested in getting good castings. Your committee asks for a full discussion of the matter in order to decide whether the work shall be conducted under the influence of our association, or be left to outside effort."

F. H. Prince, commenting upon the report, said that the establishment of a school where the fundamental principles of the foundry trade can be taught is absolutely necessary at the present time. A. W. Slocum told of the series of papers presented at the meetings of the Pittsburg Foundrymen's Association pertaining to the establishment of a foundry trade

school and the work that is being done in the Pittsburg and Allegheny schools along these lines. He said that these schools, taking the boy out of the grammar grades, first of all make him familiar with the metals found and used most largely in the vicinity in which he lives. That naturally brings up the study of iron and the students are taught to handle the metal intelligently. They receive instruction in carpenter and pattern work and get some cupola practice. He added that the understanding that some of the students showed of iron and its uses was marvelous.

Mr. West thought that not enough time is spent in teaching the art of founding in the schools where an attempt is made to give the students an understanding of the art. At Cornell the students only spend 15 days in foundry work, whereas they should be compelled to spend at least three or four years.

Mr. Best was of the opinion that a central school should be established where literature could be prepared and sent out broadcast simultaneously for the benefit of the apprentices in the foundries of this country and Canada.

J. S. Seaman said that the question of a foundry trade school would no doubt be solved at Pittsburg, the trustees of the Carnegie Institute practically having promised to have a department devoted entirely to the art of founding. As is well known Andrew Carnegie has donated the sum of $7,000,000 for the establishment of a technical school at Pittsburg, the ground for the same having been already acquired. Continuing Mr. Seaman said that the committee of the Pittsburg Foundrymen's Association is working with the trustees of the Carnegie Institute with reference to the establishment of such a department and he assured the convention that the school would answer all practical purposes as well as enabling any hard working young man to acquire a technical education.

Mr. West said that he had a talk with one of the trustees of the institute, who assured him that there was no likelihood of a foundry department being established. Mr. Seaman replied that he talked with the trustees only lately and that the foundry department has already been definitely decided upon. This department will take the young man from the public school and educate him in foundry work and allied lines to make him a finished mechanic. The entire idea of the institute was to aid young men in earning a livelihood for themselves. Inasmuch as the Pittsburg association has a committee of three co-operating with the trustees of the Carnegie Institute with reference to the establishment of a foundry department it was decided to aid the work by appointing a fourth member on the committee to represent the American Foundrymen's Association. Mr. West was appointed by the chair. The Pittsburg committee consists of Messrs. Seaman, Zimmers and Yagle.

Before proceeding with the outlined program any further Mr. Seaman, as a member of the auditing committee, stated that while the treasurer's report showed the association to be entirely out of debt, Secretary Moldenke had failed to charge the organization with $700 which was due him for salary. Mr. Seaman expressed the opinion that Dr. Moldenke's work on behalf of the association is entirely too valuable to go unremunerated and therefore proposed that ways and means be devised for paying the secretary's back salary. The matter was referred to the executive committee. Dr. Moldenke tried to interpose an objection but the chair ruled him out of order.

Insuring Patterns—Apprenticeship Period.

F. Conlin, of South Bethlehem, Pa., then read a paper on the insurance of patterns and in accordance with the memorial presented it was decided to appoint a committee of three to meet with the proper insurance officials for the purpose of considering an adjustment of the various matters pertaining to the insurance of patterns. Mr. Conlin was appointed chairman of the committee with power to appoint two other members to assist him in this work. A report is to be made at the next convention.

The reduction of the apprenticeship period in foundries was advocated in a brief paper by E. H. Putnam, of Moline, Ill. He referred to the old seven-year apprentice term in England and to the reduction to four years made in the establishment of molder apprenticeship in the United States. Great advance has been made since the four-year period was established, and any argument made for a reduction to that point now applies with greater force for a further large reduction. "The upward march of industry has, in large measure, lifted the world's work from the sphere of common labor to that of skilled mechanics. And the transition in this direction is now more rapid than ever before; and, but for the impediments that ignorance throws in the way of progress, there would soon be an end of all unskilled labor. Cut the apprenticeship period in two. Two years' application will do more toward perfecting a mechanic along modern lines than four years under the ancient regime, when mechanics were of the 'all-round' character, instead of being limited specialists, as at present, and as the future will more and more insist upon.

"The employe loses far more by loss of business incident to the protracted apprenticeship term than he can possibly gain from the comparatively large profit on the last two years of the apprentice's service. And the whole of society loses the possible increased wealth that would result from duplicating the army of skilled artisans every two years instead of every four."

In connection with Mr. Putnam's paper attention was called to the three forms of apprenticeship agreement prepared by the association for the use of foundrymen, and they were distributed among those present.

A memorial on "The Proper Valuation of Pig Iron for Foundry Purposes" was presented by Dr. Moldenke. It is given below:

Memorial on the Proper Valuation of Pig Iron for Foundry Purposes.

The undersigned respectfully begs to memorialize the American Foundrymen's Association on behalf of a better method of valuing pig iron for foundry purposes than is at present in vogue. As far back as our memories will carry us, there have been made pig irons of good, indifferent, and poor value, for the making of castings, and with few exceptions they have been sold on practically the same terms. In view of the fact that at the present time every effort is bent upon securing better material for our castings in order to hold the field cast iron is entitled to, it behooves us to devise some standard methods by which a poor iron may either be culled out, or else sold for its intrinsic value only. On the other hand, the maker of pig irons which have suffered least from careless burdening, improper mixing of ores with waste products, and other practices better known to the furnaceman, but not tending to good strength in the resulting pig, should be rewarded therefor accordingly.

It is a well known circumstance to all founders that pig irons of the same shape, grade, and presumably the same composition, but coming from different furnaces, when remelted under as nearly the same conditions as possible, will often show entirely different strengths. Those who have laboratories will know that this is even the case when the composition is approximately identical. For this reason it is somewhat of guess work to predict the strength of a casting from the composition of the irons used, and an element of doubt remains even with the best of mixing and manipulation.

Now that the Standardizing Bureau of our Association has made such a splendid record in the course of bettering methods of foundry procedure, why not let it go one step further, and instruct it to devise methods by which we can better judge the value of the pig irons offered us. As a starting point the following is suggested: The value to us of a pig iron is seen only in its remelted state, therefore to test it we must put it through cupola or furnace, and under conditions which will give it the fairest chance possible. Furthermore the iron should be cast into test bars according to the standards provided for by this association. An analysis of the pig iron and the test bars as well as the physical tests of the latter, can then be made, and we will know that a given iron when remelted and tested has such and such a strength for such and such a composition. We may then choose for our work, condemning the weak irons and selecting those which show promise of fulfilling the conditions required.

Since the furnaceman should have the means of valuing the iron he sells just as much as the foundryman who does the buying, it would be advisable that specifications be drawn up for a standard test cupola, standard methods of melting, pouring, etc., of a stated amount of pig iron. A suitable blank shall be drawn up in which can be filled all the information necessary to properly value the iron.

Furthermore, it is suggested, that besides furnishing these standard methods to the trade for the individual use of any one who desires to obtain the information, facilities be given the Standardizing Bureau to take this matter in hand themselves for the benefit of those who do not care to go to the trouble of carrying out the process on the exact lines indicated. The bureau will then be in position to actually make the bars for test and prepare the samples for analysis. The bars can then be sent for test and the samples for analytical work to the laboratory specified, or in the absence of instructions, be turned over to an approved laboratory. A moderate charge should be made to cover the work done, and to make the undertaking self-sustaining.

Should the plan here outlined prove feasible, the furnaceman who has good iron will find it a much easier matter to induce the prospective purchaser to try it. The foundryman, on the other hand, can buy the iron subject to the standard test and then demand guaranteed results.

Gradually there will be a series of tests available which will serve to indicate the physical properties of a good iron of a given composition, when remelted, and we will hear less of inferior irons worrying the founder who has to furnish high grade castings. The undersigned would therefore offer the following:

Resolved, That the committee on the Standardizing Bureau be requested to study the proper valuation of pig irons for foundry use, and, if possible, report standard methods therefor at the next convention. Respectfully submitted,

RICHARD MOLDENKE.

In view of the celebration of "Bunker Hill Day" no session was held either in the afternoon or evening. In the afternoon the entertainment committee took parties to witness a military and civic parade in Charlestown. Others attended a ball game, while those who did not care for this entertainment were shown the places of historical interest with which Boston and its environs are replete. In the evening all attended the Tremont theater.

How to Increase Foundry Production.

Before the session on Wednesday morning was called to order a large party was conducted through the engineering laboratory of the Massachusetts Institute of Technology. At the regular business session Mr. Prince invited S. D. Sleeth, of Pittsburg, to occupy the chair. David Reid, of Biddeford, Me., read the first paper, entitled "Some Methods of Increasing Foundry Production." The paper, which was printed in our last issue, proved highly interesting and Mr. Reid was requested to answer many questions regarding the operation of his plant along lines that seem quite new to the foundry trade. Asked whether he was able to operate his foundry double turn in the summer time Mr. Reid said that there was no trouble on that score. The pouring crews have been doubled for the summer, the men having one night off and one night on, working from 3½ to 5 hours. The molders on the other hand do their work entirely during the day. In answer to another question he said that they run a union shop and that the men are not paid by the piecework system but according to merit, the amount and quality of the work determining entirely. The minimum wage of the molders is $2.25 a day. Asked whether there was not some friction between the molders and the pourers off where work was spoiled he answered that while there is possibly not so much trouble as where the molders are paid by the piece, nevertheless 99 percent of the molders will object no matter which way the matter is arranged. Some of the foundrymen present were astonished at the low minimum wage and asked how many foundries are located in his city. Mr. Reid replied that there are only two, making it comparatively easy to retain the men.

H. McPhee, of Bridgeport, Conn., then read a paper on "Shop Conditions" which was not discussed. The papers on "Foundry Costs" by R. P. Cunningham, Holyoke, Mass., and "Cores and Core Arbors," by E. B. Gilmour, of Milwaukee, Wis., were read by their authors but not discussed. "Shop Tools and Rigs," by James A. Murphy, Erie, Pa.; "The Molding Machine—Jigs," by S. H. Stupakoff, Pittsburg, and "The Effect of Melting Steel with Iron in the Cupola," by H. E. Diller, Chicago, were read by name only.

Technical Training for Foundry Work.

A brief paper on the value of technical training preparatory to a foundry career had been prepared by Prof. Robert H. Richards, of the department of mining engineering and metallurgy of Massachusetts Institution of Technology, and was read by the secretary. It was supplementary of a paper Prof. Richards had written for the Chicago meeting of the association in 1900. The writer referred in opening to two classes of young men who go into the foundry: First, apprentices who hope to become expert molders; second, men who enter with the intention of becoming expert foundrymen. Of the second class the paper says:

"The modern metal works are finding it more and more necessary on account of the greater demands of the consumer, to get the right degree of hardness to suit the tool worker, of strength to satisfy the engineer, and of resistance to chemicals to prolong the life of the finished piece. They can no longer afford to ignore the chemistry of the process where a slight increase or decrease of an element may make or mar the result, nor can they afford to ignore metallography which by etched surfaces studies the arrangement of the crystals of the several compounds which go to make up the mass of the casting, and which by their size and arrangement indicate the favorable or unfavorable condition of the metal; nor yet can they ignore the pyrometric measurements by which they can follow the heats through the time of treatment and note the conditions which give more favorable or less favorable results.

"The grammar school boy who has passed through the apprentice period has not had the training necessary for intelligently discussing questions of composition, structure, or chemical stability of the metals. The technically educated, while he may not have dealt with the exact questions that come up in foundry practice, has dealt with questions quite as complex, and his school training has largely been in the direction of developing in him breadth of view and quickness of perception, mental alertness and adaptability so important in keeping abreast of the modern march of improvement. It is to say a good word for these men and to ask for them a trial that this paper is written, and it is the belief of the writer that not the young man only will be the gainer, but that the works which gets the right man with technical training will find great advantage therefrom.

"Business men will always need to have patience with the school-trained man while he gets his special practical experience, just as they do with the apprentice who makes his blunders which have to be submitted to while he is learning. The schoolman's blunders will teach him something, while the apprentice may get no wisdom. In this time of many books, the school man has an immense advantage in familiarity with the literature of the subject, thus saving time in finding out what others have done, and saving time in not repeating the disastrous experiments of others. He is also able to find suggestions for new work in this literature which may be as sounding words to the uneducated man. In the iron and steel business, the school educated man has come to the front. Why should he not also in the foundry business?"

The Walker & Pratt Stove Foundry.

In the afternoon the entire party was taken on a carriage drive through the Metropolitan Park system to the Watertown Arsenal, Watertown, Mass. After visiting the foundry and machine shop of the arsenal the drive was continued to the plant of the Walker & Pratt Mfg. Co., where all were given an opportunity of witnessing the operation of what is considered the highest type of the up-to-date foundry. Instead of being dark and dingy, with black smoke and grime everywhere, the foundry department was as bright as the most up-to-date machine shop. The floors being cemented were found scrupulously clean while the smoke and gases were drawn from the molding department by means of a complete ventilating system. Little pamphlets were distributed showing a ground plan of the plant together with the course outlined that the visitors were supposed to take in going through the works.

The visitors entered through the office and passed to the manufacturing building where the stoves, furnaces and heaters are assembled. Through this department they walked to the mill room and from there to the pattern department and foundry. The lavatory, core room and stock bins were next vis-

ited and the exit was by way of the engine and boiler room through the manufacturing building and warehouse. After the inspection lunch was served in a tent on the lawn surrounding the foundry. The return drive was through Cambridge and the Harvard University grounds. In the evening there was a vaudeville entertainment and smoker at Copley hall, while the ladies were entertained in the parlors of the Brunswick Hotel.

New Officers.

The closing session of the convention was held on Thursday evening. The first matter taken up was the election of officers for the ensuing year. The nomination of candidates for the presidency was first called for and the name of Arthur W. Walker, president of the Walker & Pratt Mfg. Co., Watertown, Mass., was the only candidate offered. He was elected by acclamation. The nominating committee consisting of William Yagle, C. Wolff, J. P. Golden, Stanley G. Flagg, Jr., and Theo. Colvin, Jr., then reported the remainder of the names selected for the various offices and all were elected without a dissenting vote. Dr. Richard Moldenke was continued as secretary, while Thomas D. West at his own request was replaced as treasurer by Willis Brown, of Erie, Pa. The district vice-presidents selected are as follows:

New England States—James F. Lanigan, Davis Foundry Co., Lawrence, Mass.

New York and New Jersey—James A. Beckett.

Pennsylvania, Delaware, Indiana and District of Columbia—F. H. Zimmers, Union Foundry & Machine Co., Pittsburg.

Michigan, Ohio, Kentucky and Tennessee—A. I. Findley, editor of *The Iron Trade Review*, Cleveland.

Indiana, Illinois, Missouri, Kansas, Colorado, New Mexico, Utah, Arizona, Nevada and California—C. J. Wolff, C. L. Wolff Mfg. Co., Chicago.

Wisconsin, Minnesota, Iowa, North Dakota, South Dakota, Idaho, Nebraska, Montana, Wyoming, Washington and Oregon—Adam W. Bair, C. M. & St. P. Ry. Foundry, Milwaukee.

Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma and Texas—J. P. Golden, Golden's Foundry & Machine Co., Columbus, Ga.

Canada—T. J. Best, Warden King & Co., Montreal, P. Q.

After his election as president Mr. Walker made appropriate remarks thanking the association for the honor. C. S. Bell offered a resolution of thanks drawn up by the ladies, to be extended the New England Foundrymen's Association, which was adopted. Resolutions were then offered and adopted thanking Secretary Moldenke for his earnest work in behalf of the association and all those who prepared papers for the meeting. A resolution of thanks was also adopted for the use of Huntington Hall of the Massachusetts Institute of Technology.

The question of a meeting place for next year's convention was then taken up. Secretary Moldenke stated that he had received a number of invitations from the Foundrymen's Association, at Milwaukee, Wis., who are very anxious to have the convention in 1903 and St. Louis is after the convention for the following year. Cleveland will also receive some consideration for the meeting of next year, the matter having been referred to the executive committee for settlement.

Foundry Formen's Association.

The matter of admitting the Associated Foundry Foremen to membership in the American Foundrymen's Association was then taken up. President A. M. Loudon of that organization stated that it now has a membership of nearly 50 and that it has been organized for the betterment of the foremen. He stated further that they occupy a peculiar position, not being able to affiliate with the molders on the one hand or the orgnaizations of the foundrymen on the other. He admitted that some foundyrmen were not exactly in favor of the organization while others believed it a good thing and he hoped that in some way it could be affiliated with the American Foundrymen's Association so that the foremen could get the advantage of the papers and discussions issued by the latter periodically. Henry Hansen, associate editor of the *Foundry* and secretary of the organization, also spoke in behalf of affiliation with the A. F. A. A resolution was offered that the matter be referred to the executive committee of the American Foundrymen's Association and the committee was instructed to meet with the executive committee of the Associated Foundry Foremen with a view of reaching an agreement which shall constitute a basis for the admission of the foremen's organization. When the vote was taken, the foundrymen opposed to the resolution demanded a rising vote, and many of the foundrymen who voted in the affirmative *viva voce* refused to express themselves in behalf of the resolution by rising. Enough however rose to carry the resolution by a large majority.

R. F. Flinterman, of Chicago, introduced a resolution providing for the organization of a chemical section of the American Foundrymen's Association. This section is to be composed of all those foundrymen and chemists who are interested in the chemical and metallurgical studies relating to the foundry. It was decided that such an organization should be formed and Mr. Flinterman was appointed chairman of a committee, he to select his two assistants, for the purpose of outlining the scope of the section.

The Question of Foundry Progress.

A. W. Slocum, of Pittsburg, asked the privilege of the floor for the purpose of refuting certain statements made during the convention that the foundry trade had not progressed during the past 30 years. He said that he has had considerable experience in brass, pipe, car wheel and general founding and was in a position to refute the statement that the foundry had not progressed. Being interested in the manufacture of car wheels he said that during the past 50 years requirements and specifications had become fully 250 percent severer and that the foundryman is compelled to advance in his art daily in order to comply with the ever increasing demands of the railroads for still better and stronger wheels. "Any man who does not think that the foundry trade has made progress should not voice or attempt to voice the sentiment of the American Foundrymen's Association by making such statements and I therefore wish to introduce a resolution to the effect that progress has been made in the foundry in the past 30 years and those who are not of that opinion do not voice the sentiment of the American Foundrymen's Association." William W. Lobdell, of Wilmington, Del., arose to tell of the progress made in the manufacture of rolls and car wheels but before he could proceed an objection was raised because of the amount of work still before the meeting. The question was then put to the convention and it was decided that he could tell of his experiences but he begged off, in view of the objection raised on account of the limited time. Mr. Lobdell took occasion to state, however, that experiments were being made at his plant upon which he would report at the next convention and which would be of great interest to the entire foundry trade. The motion made by Mr. Slocum was carried and the American Foundrymen's Association has gone on record as refuting all allegations that the art has not progressed or is not progressing.

Herbert E. Field, of Ansonia, Conn., who prepared a paper entitled "The Metallurgy of the Cupola," gave a brief talk touching up the salient points given therein. The paper on "Economy," by P. R. Ramp, of Schenectady, N. Y., was read by name only and "Foundry Accounting," by James G. Stewart was read in the same way. S. H. Stupakoff, of Pittsburg, who did not have an opportunity of reading either of his excellent papers on "The Molding Machine," concerning jigs and flasks gave a brief talk on both papers. "Brass Melting," by Charles Vickers, of Chicago, and "Cast Iron," by Percy Longmuir, of Manchester, Eng., could not be read because of lack of time.

Albert Sauveur, of Boston, editor of the *Metallographist*, was then introduced and gave an interesting lecture on the application of metallography to foundry work, illustratin with large photographs and stereopticon views. His first remarks concerned the close analogy between the structure of cast iron and the structure of steel. He said that it was the prevailing impression among foundrymen that cast iron and its constituents are much harder to deal with than steel, and that the prevailing opinion is that there is no relationship whatever between the two. "I believe, however, that this is a wrong impression and I will endeavor to show you tonight by means of photographs and other views the relationship that really exists between the two. Remove graphitic car-

bon from cast iron and you will have almost steel. In order that we may obtain an intelligent understanding of the constituents of iron we should look into the structure of steel."

Large photographs were then shown of microscopic views of pure gold and pure iron which showed that both were composed of masses of irregular grains. A similar photograph of a particle of wrought iron showed black spots due to the slag. Another photograph showed an entire change of structure due to the introduction of a small amount of carbon thereby converting the wrought iron into soft steel. Additional photographs showed the structural changes due to further increase in the amount of carbon and the structures of both medium and hard steel were illustrated. Photographs were then shown of the structure of white cast iron, which should be considered as a very high carbon steel and the similarity between the two were very apparent.

Another photograph exhibited showed that gray cast iron was made up of a matrix of steel and particles of graphite. Other photographs were exhibited showing increasing amounts of combined carbon and then the relationship between the strength of cast iron and its structure was illustrated by stereopticon views. In closing the lecturer said that the microscope has given the metallurgists an opportunity of studying the matrix of both iron and steel and the changes therein by the additions of various substances to increase or diminish the strength and other properties of the same. Prof. Sauveur was tendered a vote of thanks and was invited to present a paper during the year dealing with this matter in still more detail. The meeting then adjourned. T. J. Best presided during the evening.

During the day the visitors enjoyed a boat excursion around Boston Harbor and a stop of several hours was made at Nantasket Beach where dinner was served.

Entertainment Committees.

Too much praise cannot be given the New England Founders' Entertainment Association for the precision and completeness with which all the entertainment features were carried out. The association has the following officers: Henry A. Carpenter, president; John Magee, treasurer, and Fred F. Stockwell, secretary. The committees in charge of the entertainment features are as follows:

Executive Committee—Henry A. Carpenter, A. Carpenter & Sons Foundry Co.; B. M. Shaw, Walker & Pratt Mfg. Co.; Geo. H. Lincoln, Geo. H. Lincoln & Co.; F. B. Farnsworth, McLagon Foundry Co.; Wm. Doherty, Doherty Bros.; John Magee, Magee Furnace Co.; Theodore Colvin, Colvin Foundry Co.; Geo. B. Buckingham, Arcade Malleable Iron Works; Geo. H. Gibby, Condor Iron Foundry Co.; L. S. Brown, Springfield Facing Co.; Fred F. Stockwell, Barbour-Stockwell Co.; J. F. Lanigan, Davis Foundry Co.

Reception Committee—Geo. H. Gibby, chairman; Geo. H. Curtis, Howard Iron Foundry Co.; Jas. F. Lanigan; Geo. DeLaval, Geo. F. Blake Mfg. Co.; Walter B. Snow, B. F. Sturtevant Co.; W. H. Bense, Kinsley Iron & Machine Co.; F. B. Foster, Geo. H. Lincoln & Co.; A. J. Miller, Whitehead Bros. Co.; Arthur W. Gibby, Mechanics Iron Foundry Co.; John P. Winlock, Barbour-Stockwell Co.; Joseph L. Anthony, Weir Stove Co.; Geo. B. Buckingham, Arcade Malleable Iron Works; M. H. Barker, American Tool & Machine Co.

Finance Committee—B. M. Shaw, chairman; John Magee; Fred F. Stockwell.

Ladies' Entertainment Committee—L. S. Brown, chairman, Springfield Facing Co.; Richard E. Warner, White-Warner Co.; E. H. Waldron, Taunton Iron Works; assisted by the wives and daughters of the entire committee.

Accommodation and Entertainment Committee—Henry A. Carpenter, chairman; R. D. Reed, H. B. Smith Co.; Charles L. Newcomb, Deane Steam Pump Co.; Fred F. Stockwell; Geo. H. Gibby; Charles T. Colvin, Colvin Foundry Co.; F. B. Farnsworth; E. E. Durant, G. F. Warner Mfg. Co.; William Doherty; F. T. Towne, Yale & Towne Mfg. Co.; W. S. McMullan, Richmond Stove Co.; William H. Baush, Baush Machine Tool Co.; L. H. Stannard, F. Stannard & Son; James D. Hunter, James Hunter Machine Co.; Joseph F. Blauvelt, New England Butt Co.; Richard E. Warner, White-Warner Co.; Edward W. Anthony, Smith & Anthony Co.; J. O. Henshaw, N. S. Bartlett & Co.; A. J. Miller, Jr., Whitehead Bros. Co.; John Magee.

General Manager F. H. Clergue, of the Consolidated Lake Superior Steel Co., says: "The American iron masters are at present making a great effort to obtain Canadian trade. They are underselling Canadian-made rails by $7 per ton in the hope of killing competition. The steel plant of Consolidated Lake Superior is now turning out 500 tons of steel rails per day, and will within a few days increase this output to 600 tons. During the present season we will supply the Dominion government with 35,000 tons of rails, and we have booked Canadian orders to the extent of 100,000 tons. We are not making any foreign shipments as yet, as the home demand absorbs our complete output and will do so for some time to come."

HENRY A. CARPENTER, Pres. New England Foundrymen's Association. EDGAR W. ANTHONY, Pres. New England Stove Mfrs.' Ass'n. FRED. F. STOCKWELL, Sec'y New England Foundrymen's Association. JOHN MAGEE, Treas. N. E. Founders' Entertainment Ass'n. BARTLETT M. SHAW, Vice-Pres. New England Foundrymen's Ass'n.

NEW ENGLAND FOUNDERS PROMINENT IN ENTERTAINMENT OF THE BOSTON CONVENTION.

Tests of the new Summers steel car have been made with satisfactory results at Youngstown, O. The car is a drop bottom gondola of 50 tons capacity, but in the tests loads of more than double that amount were used. It is expected that acompany to manufacture the cars will be organized.

A press dispatch from Madison, Wis., says that the supreme court declares that the state law which prohibits any employer from discharging a workman because he belongs to a labor organization is contrary to the employer's constitutional rights and therefore void. The court recognizes the right of men to combine in labor organizations. If an employer's liberty was curtailed by legislation, however, that of an employe could be curtailed likewise; thus an employe might be punished for quitting work because his employer had formed a blacklist organization or any other objectionable combination. Louis J. Kreutzberger, of the Central Foundry Co., Milwaukee, Wis., was arrested and charged with a violation of the law by discharging an employe because he belonged to a labor organization. The suit and appeal came ultimately before the supreme court with the above result.

ELECTRIC HOISTS AND CRANES FOR STEEL WORKS.

During recent years the size and productive capacity of steel works have been increased so enormously that an urgent need has made itself felt for strong, suitable, and easily-operated lifting and transporting apparatus which will work rapidly and with great precision. That more and more of this apparatus is being operated by electricity is due to the great economy incident to its use.

A good example of a carefully planned installation of this character is described by Dr. A. Krebs in a recent issue of the *Electrical World and Engineer*. The installation is that at the new Belgian works "Société Anonyme des Aciéries d'Anvers," which is being erected at the mouth of the Scheldt. These works take Spanish iron ore, and English coal from the company's own mines, directly out of the steamships, smelt the material and then load the finished product on to the vessels.

A part of the interesting installation in this plant is shown

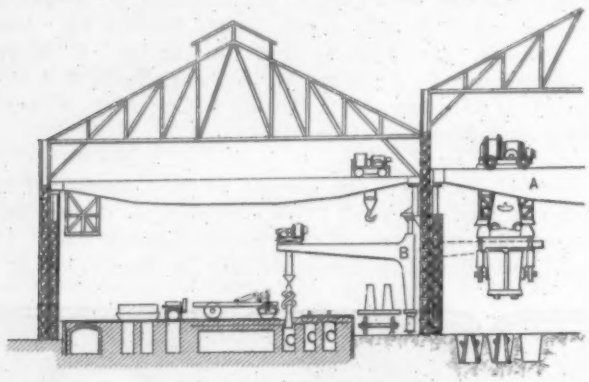


FIG. 1.—ELECTRIC HOISTS AND CRANES FOR STEEL WORKS.

in Fig. 1. In several parallel buildings, each 20 mètres in width, the ingots are made ready for the rolling mills. In Fig.

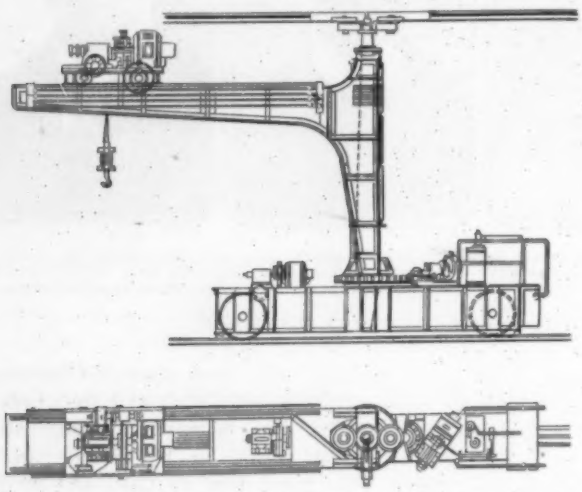


FIG 2.—ELECTRIC CRANES FOR STEEL WORKS.

1 two such buildings are shown. At the right is shown a large 40-ton crane A, carrying a ladle which holds 30 tons. The latter is supported by two chains and is guided at the two sides by heavy vertical supports fastened to the crane, so that there cannot be any oscillation of the ladle while the crane is being moved about. This also makes it possible to manipulate accurately the ladle while the metal is being poured. A transverse beam with hooks capable of supporting 40 tons may be hooked to the chains, and the crane may then be used for transporting other loads. For smaller loads up to 6 tons, an electrically operated windlass working at a greater speed and attached to the crane is used. The cast ingots are taken hold of by the so-called "velocipede" crane B in the left building, which deposits them in the pit furnaces C.

This crane, shown in Fig. 2, is not equipped like most of the moving turning cranes, with a stationary unloading device, but is provided, as in the case of a traveling crane, with a traveling carriage operating along the tracks on the extension arm, and capable of supporting 3.5 tons. The extension arm turns about a heavy, forged, hollow shaft, through which the wires pass, and on account of the large diameter of 13 mètres through which it can swing, the crane can be used equally well in both buildings. The crane can, furthermore, be moved along the entire length of the building.

There are, therefore, four distinct movements: (1) The traveling of the entire crane; (2) the turning of the extension arm; (3) the traveling back and forth of the carriage; and (4) the raising and lowering of the load. Each movement is effected by a special motor, governed by a universal controller, by means of which several movements can be executed simultaneously. This, together with the movable carriage, insure an exact and rapid manœuvering of the crane, as for the movements in three directions there are four independent means provided.

There is also in this building a so-called "cover lifting car," which raises the lids from the furnaces C and lays them to one side, while the "velocipede" crane, or the 7.5-ton traveling crane operating above it, places the ingots in the furnaces and removes them, transporting them to the rollers.

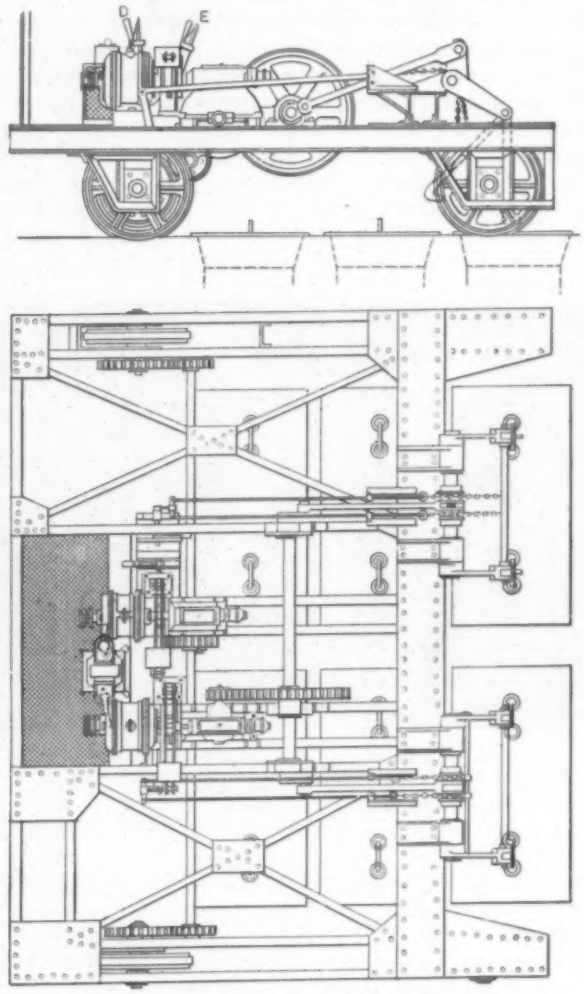


FIG. 3.—ELECTRIC HOISTS AND CRANES FOR STEEL WORKS.

As shown in Fig. 3, there are situated in the building two parallel rows of furnaces, each of which is covered by a fireproof cover, weighing about 1,500 kg. The "cover lifting car" is so arranged that it can lift off either one or two adjacent covers at the same time, as may be desired, and transport the same. The operator can put the one pair of hooks out of action by moving the lever D to the position E (Fig. 3), and then the other pair lifts off and replaces covers. In the same manner, both levers may be set in the position E, so that the car may pass over the covers which have been deposited behind the ovens. The lifting and traveling operations are effected by separate motors, but both operations can be carried on simultaneously. The operator's platform is so arranged that everything is in clear view, especially the levers which operate the pairs of hooks. The 7.5-ton traveling crane spanning 19.05 mètres, is operated by three motors, and serves mainly as an auxiliary to the "velocipede" crane described above.

Very high speeds have been chosen for all these lifting appliances, so as to correspond to the rapidity of all the other operations in these steel works. At times the traveling speed

is 100 mètres per minute, and the lifting speed 15 mètres per minute. All lifting, turning, and traveling drives are equipped with automatic, electro-magnetic safety brakes; all movements are arrested at the limits by means of automatic switches.

The above equipment, including the mechanical as well as electrical portion were furnished by the Gesellschaft für Elektrische Industrie, Karlsruhe, Baden. In addition to the above devices, the same company furnished to the above mentioned steel works nine heavy cranes, and more than 70 electric motors having a total capacity of about 1,600 h. p., all of which are operated by 190-volt 3-phase currents.

FOUNDRY ECONOMY.*

BY P. R. RAMP, SCHENECTADY, N. Y.

Economy is something that is essential in carrying on a business of any kind. The foundry business is no exception to the rule, and at no time is there an opportunity for so much thought and study along this line in our industry than now. In our efforts to cut expenses we sometimes begin at the wrong end, and as the old saying is "We spend a dollar to save a cent." During my experience as a foundry man, I have heard many men express their views as to cheapest methods of production. While I have often been able to profit by suggestions, I have listened to some arguments which were amusing. In order to produce good work, work that must come up to given specifications, we must use good material. I have a personal dread of cheap blacking, cheap foundry flour, poor molding sand, soft coke, poor iron, etc.

A poor grade of material can be purchased for nearly one half the cost of a better and more suitable article. Yet is is generally economy in the end to purchase the best, as the reduction in loss of bad castings will in many cases exceed what is gained by the reduced price of the cheaper material. The following are some of the materials that are often brought to our notice as something that can be bought cheaper and will save us money. For instance a foundry flour at one-half what the regular supply is costing us, yet when a carload is received we find it is necessary to use about twice as much as we take of the old flour to do the same amount of work. This is detrimental in more ways than one.

In making cores or dry-sand molds, the more flour is used in the sand mixture, the more gas there is generated. And the more vegetable matter that will produce an excessive gas, the greater possibilities there are for a cut, scab, or a blow, which results in a bad, or dirty casting. The greater the amount of flour we are forced to use in order to make strong cores or molds, the more they will swell while drying. This causes them to vary in shape and size.

Another item is "plumbago," "blacking" or "dry sand facing." We may be paying 4 or 4½c per pound for a lead that is doing good work and pealing the castings in a very satisfactory manner, when along comes a "supply man" and induces the purchasing agent to buy a car-load of a cheaper lead, say for 2½c per pound. This lead he will probably say, is used by several large concerns, whose product we know is all that could be desired. Here is where an impractical man is led astray. He does not consider what quality of sand the parties referred to are using behind this lead, perhaps this is a good open sand that would do the work nearly as well without any lead or facing. We try this lead on our work, our sand is close and contains matter which promotes the formation of gas, and this creates in the molted metal an uneasy motion while it is being poured and after the mold is filled before it solidifies. This action of the iron causes additional wear on the surface of the mold and the cheaper grade of blacking will wash and rise to the surface, thus producing a dirty casting.

Poor molding sand is a great draw-back. I have in mind a firm that obtains a very poor grade molding sand from a supply house some 200 miles away, when better sand could be dug within one mile of the shop. The only objection is, this good sand cannot be shipped in carload lots, but must be hauled by wagon loads, which is really preferable as it is an easy matter to reject the wagon load of poor sand and receive a better grade from the same wagon an hour later. But 'tis no small job to be compelled to work up three or four carloads of inferior material.

Poor coke causes much trouble. I know of a large concern in the West who use a very cheap grade of soft coke for melting purposes because it can be purchased at about $3.00 per ton less than good seventy-two hour coke would cost. They claim a saving in this method, but it is my belief that if they should consider the extra time consumed in melting and the castings that find their way to the scrap pile on account of dull iron, they would realize that there is more economy in using a good grade of coke.

The same is true where one blower is used to furnish wind for two cupolas, and the capacity of the blower is but a little more than is required for one cupola. This makes it necessary to put the blast on at say 12:40 or 1 o'clock, and with two cupolas one 60 inches and one 48 inches diameter, it is a good job to melt 60 tons by 5 o'clock, which means 15 tons per hour for two cupolas. Now, if an independent blower were used for each cupola, with the proper tuyers location, the time consumed in melting could be cut nearly in half. This would make it possible for the molder to work up till 3 o'clock p. m. at molding, instead of beginning to pour off at 1 o'clock, which would mean two hours more. This would in a short time pay for several new blowers.

When we refuse to give our molders good flasks and good patterns to work with in order to save, we often lose more in bad work than it would take to build new patterns and flasks, to say nothing of the delays caused by failures of molders to make good work which may be directly traced to poor rigging.

To those who have always considered the building of flasks, an unnecessary expense, and have practiced the most rigid economy in regards to them, I want to say that good molders are hard to get and expensive. In shops where the proper appliances cannot be secured, they are hard to keep. But if we make the equipment of the foundry a personal study, and build our flasks, patterns, etc., in a manner that will simplify the work regardless of first cost, the question of good molders will be settled. With all conditions as they should be and the work and methods made easy it is possible to develop good molders out of what men we have in our own shop or even out of men that have never handled a rammer or shovel. I would prefer the latter as I believe there is much more economy in teaching a green man how to mold and paying him for scrap castings for a couple of weeks, and later receiving a fair day's work from his floor the year around, than there is in compelling a molder who has worked at the trade all his life to work in a different manner than he has been accustomed to.

The idea of economy with reference to pattern making is in some cases a delusion. For instance it is more expensive to give a large gang of men one locomotive cylinder pattern and have them ram and finish two or more a day, than it would be to make two or more patterns and let them make one a day each. Two molders will accomplish more in a day than one-half of what four men will accomplish on the same job with only one pattern. Besides this, much better work is the result of placing fewer men on the job. Hence where we have a number of castings to make in a rush, it is cheaper to build an extra pattern than to crowd too many men on one pattern.

In making iron flasks for locomotive cylinders it is economy to make separate flasks for the different sizes, where there is any great variation. It is false economy to try to use one large flask for all sizes. The reason is plain enough. On the small ones the same amount of labor is required to ram it up as on a large one when one large flask is used. And in drying the mold double the amount of fuel and time is required, to say nothing of the danger of the large body of sand sagging and causing the mold to lose its proper shape.

There are many other things that could be mentioned which cause much waste, such as insufficient dry sand and core oven capacity, crooked core plates, improperly constructed patterns, system of handling melted iron, casting, sand, flasks, etc.

The different items I have made mention of in the above are not new to foundrymen. Although we all realize that these things help to increase the costs of production, there are many foundries today where just such conditions prevail.

*Read at the Boston meeting (June, 1902,) of the American Foundrymen's Association.

CAST IRON AND ITS CONSTITUENTS.*

BY PERCY LONGMUIR, MANCHESTER, ENG.

The term cast iron embraces irons possessing widely different properties. The pig iron of the chemist and the cast iron of the founder are, of course, synonymous terms, cast iron being to all intent and purposes remelted pig. Generally speaking, cast iron may be regarded as metallic iron, associated with varying amounts of carbon, the content of which is seldom lower than 2 percent. In addition to carbon there are always greater or less amounts of silicon, manganese, sulphur and phosphorus present in every variety of cast iron.

Other things being equal the mechanical properties of any variety of cast iron depend upon the amount of these constituents and the relationship they bear to each other. This combination may be such as to favor the production of a high quality iron, or it may be such as to produce one that is poor. High and low quality are terms of convenience rather than of exactitude, and every iron produced is applicable to some definite purpose for which its quality may be regarded as good.

In reviewing the constituent elements of cast iron the foremost and most important in effect is that of carbon. Though it can hardly be said that the presence of any one element definitely rules the quality of cast iron, yet this element closely approaches this position. In a large measure it is the amount of carbon present in any iron that determines its quality and the purpose to which it is adapted. With average grades of cast iron the total carbon present varies between 2 and 4.5 percent. This latter amount is exceeded in certain alloys such as ferro-manganese or ferro-chrome, but these are instances distinct from the cast irons. The actual occurrence or mode of existence of carbon in iron is to some extent a controversial matter. To the founder, however, who must necessarily keep on the practical side of science, carbon is known in two conditions, these are as free carbon or graphite, and combined carbon or iron and carbon in a state of definite chemical combination.

Cast iron, whilst fairly strong in compression, is weak in tension. Apart from other contributory causes this low tenacity may, to some extent, be explained by the distribution of the free carbon which is familiarly shown in a fractured sample of pig iron. The flakes of graphite or free carbon when the cast iron is in tension, act as isolating media, and a series of these little cuts, as it were, offer a convenient route along which fracture may readily travel. With a compressive force these conditions are not so evident and consequently cast iron is well adapted to resist crushing forces. Naturally a high content of free carbon denotes a soft iron, but it is the amount of combined carbon that regulates the quality of any iron and determines its suitability to meet any specific purpose. This relationship of carbon and iron is shown to best advantage with the steels, and in all steel works practice a given content of carbon denotes that steel to be applicable to a certain definite purpose. For instance a steel of razor quality would never meet the conditions required from one of "axle" or "tyre," temper and vice versa.

Hence standards have arisen which in the case of ordinary iron carbon steels are of almost universal recognition. These may be briefly summarized as follows:

Class of Steel.	Content of Carbon.	Purpose.
Bessemer	0.20 percent	Plates, sheets, etc.
"	0.25 "	Axle steel.
"	0.30 "	Tyre steel.
"	0.50 "	Spring steel.
Open-hearth	0.20 "	Boiler plates.
"	0.65 "	Spring steel.
"	1.30 "	Tool steel.
Crucible	0.90 "	Chisel steel.
"	1.10 "	Large files, drills, steels.
"	1.20 "	Turning tool steels.
"	1.40 "	Saw file steels.
"	1.50 "	Razor steels.

The utility of carbon standards so well shown in the foregoing table unfortunately cannot be carried to the same exactitude in the case of cast irons. But recognizing combined carbon as the controlling factor the following four percentages give approximate representations of the quality denoted by that percentage:

Content of Combined Carbon.	Variety of Cast Iron.
0.10 percent.	Dead soft.
0.20 "	Soft.
0.50 "	Highest tensile strength.
0.70 "	Highest transverse strength.

These figures relate of course to irons of normal qualities. The difficulties in fixing exact carbon standards for cast irons are great, owing to the complex character of the metal and the high content of elements other than iron.

From carbon to sulphur is a fairly natural step owing to a relationship often found between these two elements in a series of ascending irons produced from a similar grade of ore. Sulphurous irons, apart from other drawbacks, are generally speaking "hard." This hardness and the relationship just spoken of may be found in the fact that high sulphurs usually accompany high combined carbons. A glance at the following series of ascending irons will illustrate this feature:

Number of Iron.		1	2	3	4	5	Mottled.	White.
Combined	Carbon	0.50	0.60	0.80	1.10	1.30	1.80	3.00
	Sulphur	0.02	0.02	0.04	0.08	0.11	0.15	0.20
	Silicon	2.50	2.30	1.80	1.50	1.20	0.70	0.30

When producing iron in the blast furnace the lower temperatures favor the production of sulphurous irons, high in combined carbon and correspondingly "hard" or "white." These conditions are intensified if the slag be strongly acid, and are restricted if much manganese be present, sulphur in the latter case combining with the manganese, forming a slag of manganous sulphide. These conditions are interesting to founders in that the cupola furnace bears a certain analogy to the blast furnace.

With the cupola slow melting, accompanied by a low temperature, yields conditions which favor the taking up of more sulphur from the coke than is the case with quick working at high temperatures. An interesting increase in sulphur resulting from three remeltings is shown below, which, by the way, is not given as representing first-class melting practice.

	1st melt.	2nd melt.	3rd melt.
Sulphur %	0.04	0.10	0.20

Phosphorus appears to have little effect on the combined carbon, and in a series of ascending irons this element usually remains fairly constant. To some extent it lightens the appearance of a fracture and has a slight hardening effect on the iron with which it is associated. From a foundry point of view phosphorus is not nearly so harmful as sulphur, and is less of an evil to the iron founder than the steel maker. Phosphorus in cast iron promotes soundness, increases fluidity, and with it the capacity for taking and retaining the sharpest details of a mould. Castings such as machine details, gearing and the like, which have a fair amount of shock to resist, may contain up to 5 percent phosphorus. However, the general run of castings may contain up to 1.5 percent, but higher percentages than this are only advisable for castings in which strength is immaterial.

Manganese increases the capacity of an iron for carrying carbon and by permitting the formation of double carbides of iron and manganese increases the hardness according to the content present. This hardening effect is, however, neutralized in the presence of high silicon.

Iron and manganese combine in proportions up to 80 percent of the latter, the product being the familiar ferro-manganese. With lower amounts of manganese, that is between 12 and 20 percent the product, is known as "spiegel" or "spiegeleisen."

Manganiferous pig irons are specially useful in foundry practice for mixing with others contaminated with an excess of sulphur. In this manner manganese may act as a softener, that is by effecting the removal of sulphur. Generally manganese increases the hardness and closes the grain, and hence is valuable in castings that have to be finished up dead smooth. With an iron in which silicon and sulphur are normal from 1 to 1.50 percent, manganese will do all that is desired. Of this quantity a certain amount will be oxidized, which, varying with furnace conditions may reach a total of 40 percent.

Silicon is present in every variety of cast iron, and owing to its effect on the formation of combined carbon has been

*Read at the Boston meeting (June, 1902,) of the American Foundrymen's Association.

conveniently regarded as a ready means of controlling the quality of an iron. Silicon acts indirectly as a "softener" by producing conditions which favor the precipitation of carbon in the graphitic form, and other things being equal results in an iron, the softness of which depends upon the extent of this precipitation. Hence the silicon contents of various irons offer ready means for the adjustment of mixtures, and consequently there have arisen silicon standards. In general practice these standards cover the percentages of silicon from 0.5 to 2.5, ranging from castings such as cylinders and valve bodies down to soft castings, pulleys and the like. The influence of silicon on cast iron has been very fully investigated by Professor Turner, of Birmingham University in England, and by Mr. W. J. Keep, of Detroit. The following table is a summary of Professor Turner's results:

	Content of Silicon per cent
Cast iron yielding maximum hardness	0.60
" " " crushing strength	0.80
" " " density in mass	1.00
" " " crushing, tensile, transverse strength	1.40
" " " tensile strength only	1.80
" " " softness and general working qualities	2.50

The utility of silicon standards is shown in the foregoing table, and for general purposes a mixture figured on the content of silicon alone will give a reliable result. But it must be remembered that silicon acts indirectly, and that it is the combined carbon that rules the destiny of any iron. The relationship of silicon and combined carbon are shown in the analyses quoted earlier in this paper.

Very briefly the elements present in every variety of commercial cast iron, have been mentioned, and in addition to these already quoted the number may be increased by the designed or accidental presence of other metals, such as aluminum, copper, titanium, chromium, etc. Therefore the simplest variety of cast iron is necessarily of a complex character, the physical properties of which are dependent upon the relationship these constituents bear to each other.

Of these constituents there are never less than seven present, or if we regard cast iron as a single metal, contaminated with foreign elements, we then have a body of iron associated with greater or less quantities of other six dissimilar bodies. That is to say iron is the matrix, and through this are distributed—as fruit through a cake—the other ingredients. Questions naturally arise as to the mode or manner of this distribution. Does the element in question penetrate the iron evenly and as an element?—if so my illustration of the fruit through a cake is inadmissable. Or is the element distributed in patches, as an element, through the iron? That is to say, do particles of iron, particles of manganese and particles of sulphur exist in contiguity, and as free elements? With the one exception of graphite, practical experience would not confirm such a supposition. On the other hand do the elements form definite compounds with portions of the iron in which they are held, and in the cold solidified metal exist as definite chemical compounds? A further point also occurs under this head, and that is as to the manner in which enormous physical changes are produced by the presence of exceedingly small amounts of foreign matter—sulphur forming a familiar example of this effect of traces. These and like questions lead one into a maze of scientific theory and speculation. Therefore the following fragmentary jottings are merely suggestive, and not in any sense conclusive.

In viewing the seven constituents that together form cast iron, it is evident that one, graphite, does exist in a state of freedom—that is as a form of carbon pure and simple. It has a mechanical effect as shown earlier, and it produces softness in the iron indirectly by reducing the amount of carbon available for combination. Graphite, therefore, having only a mechanical effect, can only act within fairly well recognized limits. But it requires no great stretch of imagination to realize in part the latitude in character offered by the remaining six constituents. Carbides of iron and manganese, silicides of iron, sulphides of iron or of manganese and phosphides of iron interspersed through free iron offer a range of latitude, varying according to the degree of the penetration of the iron by the compounds. In this manner the effect of mere traces may be followed. Sulphur in suitable combination with iron or manganese in the form of a brittle sulphide, will occupy an area out of all proportion to the minute quantity of free sulphur originally present—the trace thus becoming enormously multiplied, and its effect carried to a far greater extent than any possible by the element in its free state. The energetic effect of small amounts of combined carbon may be accounted for in this manner and with an increasing content of carbon a greater distribution of the carbide occurs and yields a degree of hardness proportionate to the amount of carbide present. It is evident, however, that a point must be reached at which saturation occurs, that is to say, when the iron has combined with as much carbon, phosphorus or other element as it can hold—the intrusive compound then penetrating the whole of the metal and corresponding with the disappearance of free iron. That this is the case has been very clearly and forcibly demonstrated by Professor Arnold in his exhaustive researches on carbon in iron.

Further thoughts are also suggested in that each of these carbides, silicides, phosphides and sulphides possess varying co-efficients of contraction and must necessarily possess varying points of crystallization—that is to say, the compounds will crystalize according to their degree of fusibility and therefore crystallization may extend over a wide range of temperature. Conversely on heating the more fusible compounds will naturally be the first to soften and liquify. Therefore at temperatures far below solidification point there may exist within the frozen metal pasty or semi-pasty particles of a readily fusible compound. Founders who have observed pig iron melting on the hearth of a reverberatory furnace or an ingot of brass in a crucible, will have noticed an exudation of these fusible compounds, before the liquifaction of the pig or the ingot.

There must be then within a mass of cast iron containing say 93 percent iron and 7 percent of other constituents, many conflicting forces, and the question arises at what temperature is an equilibrium established. It is evident that in large castings these internal forces are intensified by the unequal cooling from outside to centre, and that in a mass so cooling each rise of temperature towards the interior will represent a more or less distinct state of strain, but as the outside crust freezes the internal strains are imprisoned and the question again arises when is an equilibrium established

These thoughts are of interest chiefly in the case of castings which are employed in positions in which temperature plays a part. It is within every day experience that occasionally a casting successfully treated hydraulically will fail when put on steam trial. May not this failure be due to the presence of compounds which are affected by the temperature of the steam? Imagining for one moment a solid consisting of several dissimilar ingredients distributed with more or less regularity through a common matrix, and we have a fair idea as to the structure of solidified cast iron. On the application of heat an expansion occurs and the more fusible areas distributed through the iron begin to soften and so destroy the continuity of the mass, rendering it liable to rupture by shock. Assuming that the temperature be too low to soften these compounds, but that it be sufficiently high to modify their structural arrangement, we then have a possible explanation as to why in certain cases a casting will resist a definite pressure applied by means of cold water, and yet will leak on a similar trial by steam.

Temperature and pressure seriously affect the working life of any casting, but generally speaking iron castings are not subjected to extremes on either hand.

Further than this it is usually the custom to design castings of greater bulk than that theoretically demanded in order to secure stability. This excess of bulk forms in most cases a reliable factor of safety, allowing the casting ample margin to efficiently meet the usual working conditions. It is of course abnormal results that direct attention to the possible combination of the constituents of cast iron in either beneficial or abverse forms.

The writer had hoped to illustrate this paper by a few micrographs and typical cast iron, but regrets that the available free time precluded this.

The Vandegrift Coupling Co., of Indianapolis, has had under consideration removing to Washington, Ind.

RAIL BENDING AND STRAIGHTENING MACHINE.

The accompanying illustration shows a rail bending and straightening machine designed and built by Williams, White & Co., Moline, Ill. This machine has capacity of bending or straightening 8-inch I beams and smaller. The main frame of the machine is made of one solid casting with throat 11 inches deep. The length of the stroke is 2 inches and the ram has an adjustment of 8 inches. The hand wheels on the side are used for raising and lowering the rollers to suit special requirements of a particular job. The machine weighs about 11,000 pounds. As shown it is belt driven, although an electric motor can readily be applied. Williams, White & Co. build these machines.

Order for New Lake Vessels.

The American Shipbuilding Co. has closed contracts at Cleveland for six freight steamers that will cost $1,200,000. The first order was for five freighters and was placed by the United States Transportation Co. In carrying capacity the boats will range from 5,200 to 6,200 tons on 18 feet. The largest of the steamers will be 434 feet over all, 414 feet keel, 50 feet beam and 28 feet deep. Three of them will be 400 feet over all, 380 feet keel, 50 feet beam and 23 feet deep. The smallest of the steamers will be 390 feet over all, 370 feet keel, 48 feet beam and 28 feet deep. They will all have triple expansion engines and Scotch boilers, which will be fitted with Ellis & Eaves induced draft. The boats will be built at the Lorain and South Chicago yards, and, according to the contract, they are to be completed April 15, 1903.

The order for the sixth steamer was placed by Henry A. Hawgood. She will be 434 feet over all, 414 feet keel, 50 feet beam and 28 feet deep, and will have triple expansion engines and Scotch boilers. This boat will also be ready for business by the opening of navigation next spring.

Oscar Barnett Foundry Co., of Newark, N. J., has secured an order for 1,000 special iron flasks from a prominent Western foundry.

The last vestige of the Illinois anti-trust law has been declared unconstitutional by Judge Haney, of Chicago, in a decision affecting fifty-four cases against members of the Illinois Manufacturers' Association. The particular case decided was that against the Butler Steel Foundry & Iron Co.

OBITUARY.

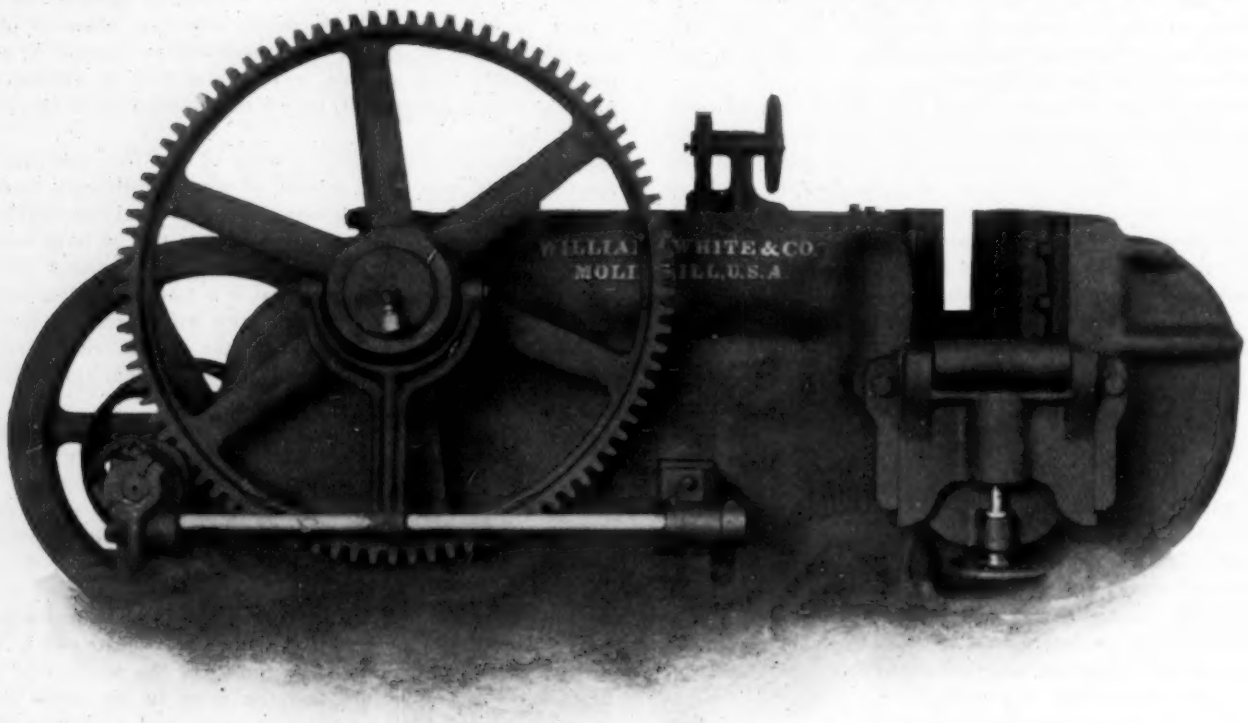
William Swindell, the pioneer furnace builder of Pittsburg, whose patents are in general use in iron and steel plants in both the United States and England, died at his home in Allegheny, Pa., on Thursday, June 19, of heart failure. Deceased was born in Allegheny in 1834 and at an early age became identified with the erection of furnaces for iron and steel works. He was the head of the firm of William Swindell & Bros., 313 Sixth Ave., Pittsburg, and during his active career was granted no less than 85 patents on regenerative gas furnaces and gas producers. For many years he was agent in this country for Siemens & Co., of England, and for some time had charge of the furnace department of the Ft. Pitt Foundry Co., of Pittsburg, where many cannon were cast during the Civil War. In 1879 he was elected a member of the American Institute of Mining Engineers. Mr. Swindell took a very active interest in political affairs in his city, having served in the local councils for 17 years.

Major John Rebman, general manager of the plant of the Pittsburg Steel Foundry Co., Glassport, Pa., was almost instantly killed while attempting to board a train at Glassport on Thursday afternoon, June 19. Deceased was well known in iron and steel circles, having had much experience as manager and superintendent of both blast furnaces and steel works. He was born at Chambersburg, Pa., in 1836 and after serving three years in the Civil War went South and entered the employ of the Knoxville (Tenn.) Iron Co. He was manager of this plant for many years and then became general manager of the furnace of the Cherry Valley Iron Co., Leetonia, O. In 1899 he was engaged by the Pittsburg Steel Foundry Co. to superintend the erection of its foundry at Glassport and upon its completion became manager of the plant.

Norman S. Byram, president of the Byram Foundry Co. and the Indianapolis Chair Co., died in Indianapolis June 16, aged 71.

Adam Laytham, 61 years old, died Saturday at his home in Passaic, N. J. For three generations the Laythams have been owners of foundries. Mr. Adam Laytham was the owner of the Eagle Brass & Iron Foundry, of Passaic, and was part owner of several other foundries.

The Battle Creek Iron Works Co., Ltd., of Battle Creek, Mich., will occupy its new shops about Sept. 1. The company will manufacture the Burns automatic drilling and milling machine and other specialties.



RAIL BENDING AND STRAIGHTENING MACHINE.

THE MOLDING MACHINE.

BY S. H. STUPAKOFF, PITTSBURG.

Jigs.

There is no doubt that plate molding in its present shape, or rather as ordinarily applied, is practically excluded from jobbing shops. But, if a plate is used in connection with a suitable jig, specially prepared for the purpose, objections are not only overcome, but the application and use of plates offer excellent advantages, even in such cases where only a small number of castings of the same pattern are required at one time. At best, the economic use of plated patterns is limited by the shape and size of the castings. The fundamental principle involved in their construction and application must be fully understood by the user, if satisfactory results are expected. Irrespective of its relation to the molding machine, it would seem that this subject—on its own merits—is of such importance that it should be investigated by all foundrymen. It should specially interest the majority of our members. I have therefore somewhat enlarged the scope of this treatise on the molding machine by including a detailed study of the construction and modus operandi of this particular contrivance.

To begin with, it should be understood that all plates are provided with guide-pin holes, which are accurately fitted to corresponding guide pins forming part of the flasks. Unless special flasks are used in connection with such plates the customary flask pins should not be confounded with these guide pins, as they will never answer the purpose. In order that misconceptions in this respect may be avoided, this term will be adhered to in what follows, and strict distinction will be made between flask-pins and guide-pins whenever they may be mentioned in the course of this work.

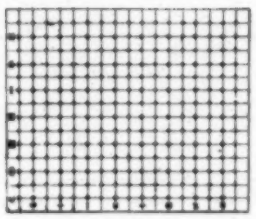


FIG. 1.
PLATE WITH GUIDE PIN HOLES.

FIG. 2.
TEST PIN WITH END CUT DOWN.

The guide-pin holes, G and G¹, Fig. 1, are perfectly arranged on opposite ends of the plate, in even multiples of an inch, and equi-distant from its center and on a line dividing the plate into two equal rectangles. There are exceptional cases, in which three or four guide-pins must be used. The most serious objection against this arrangement is the greater difficulty experienced in locating the patterns correctly.

Accuracy in preparing the plates becomes of the utmost importance, as the magnitude of all errors occurring in the original laying out is doubled by each subsequent operation. The guide-pin holes should be drilled and reamed out at right angles to the surface of the plate, and it is advisable to provide them with hardened and ground steel bushings. All guide-pins should be of uniform diameter irrespective of the size of the plate. A pair of test pins should be kept on hand, which snugly fit the guide-pin holes; one-half of one of their ends should have been cut down to about ¾ inch in length, leaving as remainder *exactly* one-half of the cylindrical portion. (Fig. 2). If these test pins are inserted into their respective holes and a straight edge be placed against their flattended faces, it will serve for locating the base or the center line of the plate, for marking off and laying out the dowel pin holes, arranging the patterns and checking off all work relating to it.

The exact location of the center of the plate, and likewise the center of the flask, is found by dividing the base line from center to center guide-pin hole into two equal parts. Let us drill a hole C in this plate, (Fig. 3) and let this hole serve as the starting point for future operations. Now we will assume that we have procured a tri square with a row of holes drilled in each of its legs; these holes are spaced equally—say 1 inch apart—care being taken that each row stands exactly in a straight line, and that both rows include an exact angle of 90 degrees. We place this square in such a manner on our plate that the hole in its apex corresponds with the center hole C of our plate, and insert a good fitting dowel pin through both. Thus we are able to shift the square over the whole surface of the plate by turning it around the center pin. Next we bring one leg of the square over the base line of the plate and insert a second dowel pin (which may be shouldered if necessary) through G into the corresponding hole of our square. Secured in this manner the square should be absolutely rigid and should not shake to right or left on the surface of the plate. We now drill one hole each into the plate through the guides H and I of the square, then we remove the pin from G, turn the square around the center pin over 90 degrees, so that one of its legs points upward and the other one to the left, insert a dowel through the hole in the leg pointing upward into the top hole I^1 of the plate, and drill the hole H^2; finally we turn it again over 90 degrees, secure it in the same manner as before,and drill the hole I^2. Fig. 3 illustrates the square in the first position as located on the plate; the holes H^2 and I^2 which are drilled subsequently, are shown. We shall call these holes, "pilot holes," in order to distinguish them from others in the same plate. These four pilot holes include

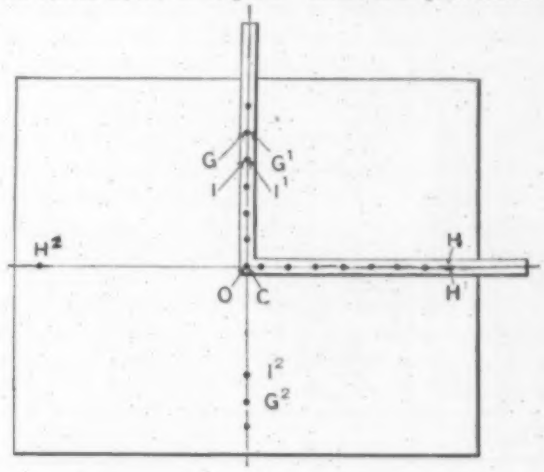


FIG. 3.
SHOWING HOW CENTER OF PLATE IS LOCATED.

an exact rectangle or square, and each opposite pair is located at uniform distances from the center of plate and flask. It will be understood that it is not absolutely necessary to employ the square for drilling the pilot holes. For instance, after one plate has been prepared in this manner, this plate can serve as a jig for drilling any number of additional plates in the same manner by a single setting. Such an original or master plate is especially serviceable, if all holes are provided with good steel bushings. The pilot holes in connection with the center hole will serve us hereafter as guides for locating pattern dowels.

Our object in view is to use this plate as a base for any and all suitable patterns, and as an illustration we will arrange it for the reception of patterns of a globe valve and a bib cock. We will assume that the patterns are all in good shape and properly parted. However, they shall originally not have been intended for use with either molding machine or drawplate. Our plate and flask are of a suitable size, but the job is in a hurry—as all jobs are—and we must get out quite a number of these castings today. What are we going to do about it? Take my advice and make it in the old fashioned way, unless you are provided with a suitable jig plate and an inexpensive, but a good small drill press, which was never used by your blacksmiths or yard laborers, but was expressly reserved for this purpose only, was always under the care of a mechanic who understood how to handle it, and who took pride in keeping it in good shape.

This jig plate (Fig. 4) should be provided with a number of holes, two rows of which, at least, are drilled exactly in the

same manner as those in the above mentioned square; the balance are laid out preferably, but not necessarily so, in straight and parallel lines, all equi-distant from each other. Its dimensions should be sufficient to cover one corner, or one-fourth of your pattern plate. If these things are part of your equipment you will have easy sailing, and you will be better fitted to tackle the job than your competitor.

Place this jig in such a manner in one corner of your draw plate that the hole O (Fig. 3) corresponds with the hole C in its center, hold both together with dowel pins inserted into the pilot holes, and drill the holes through the jig into your plate, which are required for securing the patterns in the predetermined places. To avoid mistakes be sure that the hole in that particular corner of the jig, which corresponds to the one described as located in the apex of the square is distinctly marked on both sides of the jig plate—in our figure marked O—and note carefully which holes in the jig were used for drilling the dowel holes into the pattern plate. Thereafter turn the jig upside down on the pattern plate, insert the dowel pins again through the same holes O and OI into C and I^1, and the third one through OH into H^2, and then, as before, drill through the same guide holes of the jig the corresponding dowel holes into the second quarter of the pattern plate. Repeat the same process at the lower half of the plate, being always careful that C and O remain together and your plate is ready to receive the patterns.

That there may be no doubt as to the method of operation, as guides for drilling the second quarter of the pattern plate. Identically the same process is then repeated at the lower left hand and lower right hand corner of the plate, by first turning the jig plate around the imaginary hinge center OH, and then around OI.

In order to prepare the patterns to suit the above conditions, we proceed exactly in the same manner, by securing one-half of each separately, and always the one which has the dowel holes, at the previously determined place on the jig plate and drilling clear through them the holes which coincide with those drilled previously into the pattern plate. The second halves of these patterns are then placed in position against the first (drilled) halves; they are prevented from moving sideways by their original dowel pins, and they may be held together by suitable clamps. These clamps are preferably made of a universal type which adapts them for use with all kinds of patterns, their lower portion being constructed in the shape of a frame which rests on the table of the drill press without rocking and which is adapted for fastening the patterns in such a manner that their parting faces stand parallel to the drill table. The half of the pattern which has been drilled first with the aid of the jig occupies the upper position in this clamp or drill frame, and the holes in this one will now serve as guides for the drill to drill the holes in the second half which stands directly underneath. Finally have the original dowel pins of the patterns removed and fasten all parts separately in place on the pattern

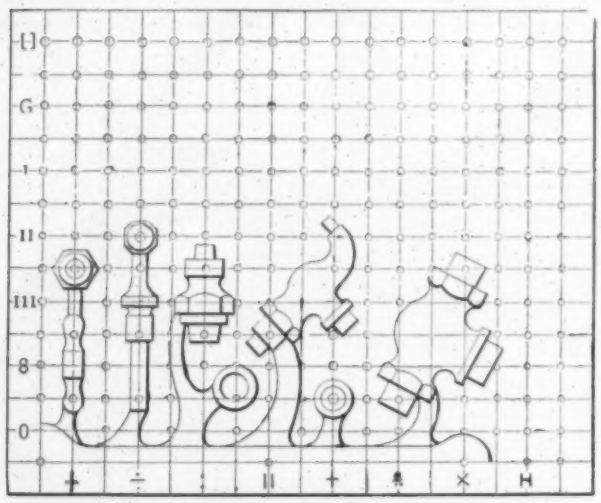


FIG. 4.—JIG PLATE.

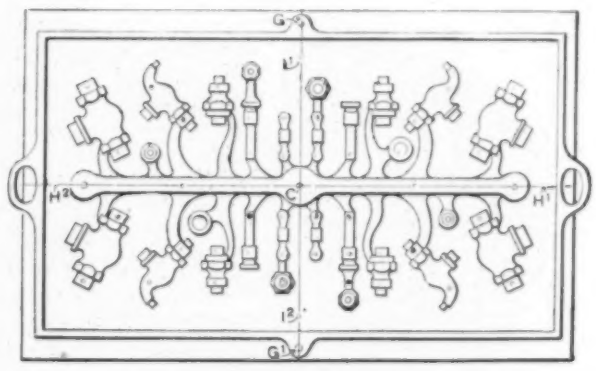


FIG. 5.—PATTERN PLATE.

I suggest that you will refer to the two plates (Figs. 4 and 5). The former represents the jig. In faint lines thereon is shown the outline of the position of patterns, which corresponds to the arrangement of the same on the pattern plate (Fig. 5). Horizontal and vertical lines, which are provided with identification marks, cross all the holes in the jig plate. The holes which are to be used in this special case as guides for drilling the necessary dowel pin or screw holes in the pattern plate are indicated by circles drawn in heavy. Thus, the holes II × and 8* are used for securing the globe valve body pattern, II + and III || for the body of the bib cock, and so forth. By placing the onion skin in such a manner over the drawing of the pattern plate, that its hole O corresponds with the center hole C of the latter, and OI and OH respectively with I^1 and H^1, it will be noticed that the outline representing the patterns cover each other in both cuts. The jig placed in this position over the pattern plate, and secured to it by the pilot pins at O, OI and OH is used in this manner for drilling all dark lined holes in the right hand upper corner of the draw plate. This being done, the pilot pins are withdrawn and the jig plate is reversed and turned into the upper left hand corner of the pattern plate, just as if it were hinged at the line OI, the pilot pins are replaced into the same holes of the jig as before and in this position they will secure it to the pattern plate by entering its pilot holes C, I^1 and H^2. It will be observed that in this position also, and equally well, the outlines of the patterns in both cuts fall exactly together. The jig is used in this position as before, the same guide holes which were used in the first position in the upper right hand corner serve again plate by either dowels or screws, or both, whichever may be preferable and most convenient in your particular case.

If I may call your attention again to the drawings, you will observe that we have prepared the pattern plate in this manner with four complete sets of patterns; yet, we have used only two. The castings resulting from the use of these plates should be perfect as to match. The amount of labor required to withdraw the patterns from the sand is reduced to a minimum, additional time is saved by the use of a stationary gate or runner on the plate, and double the quantity of castings can be produced in this manner with the same number of patterns and in the same number of flasks. All this can be accomplished by making an effort of no longer duration than it took to describe.

If you have followed the above description carefully, you may have noticed that it is not necessary to have an individual plate prepared for each set of patterns. Yet I thought it better to describe this method of preparing pattern plates and patterns for plate molding in detail, than to leave room for any doubt or error. You can easily see that much of the time which it apparently took to get the plate and patterns ready for the molder, can be saved by providing the entire surface of the plate with dowel holes before putting it into use. This should be done with the aid of the jig and in identically the same manner as has been sufficiently explained in the foregoing. Thus, only new patterns have to be prepared for the purpose, and all others, which once have been fitted, are easily replaced and secured to their correct positions on the plate, providing their dowel holes were promptly provided with specific num-

bers, letters or identification marks. The additional holes in the plate will not impair its working qualities, but they could be easily closed up with beeswax if objectionable. Finally, it is well worthy to note that each plate can be used in connection with all patterns within its range, and that it can be kept in continuous service, while the patterns may be changed at will, and as often as desirable.

While the above description may appear somewhat too extended, I assure you that a serious mistake would have been made had the subject been slighted merely for the sake of brevity. At the same time I will say in justification of my apparent digression, that my original subject has not been sidetracked. At first sight it may appear that the construction and the manipulation of pattern plates has but little connection with molding machines, but I hope that I will succeed in showing in the course of this work that they are not only intimately connected with each other, but that they are in fact the principal parts of the molding machines. The lack of intimate knowledge of how to make use of them to the best advantage, the want of proper means to effect this purpose and the wretchedly little effort which is made to catch the right spirit of their nature is generally the reason why a molding machine becomes an elephant on the hands of a molder and an eye sore to its owner.

Flasks.

Talk to a foundryman about flasks and you will touch another sore spot. No wonder, for flasks are a continual drain on the exchequer. Founders will tell you that if it were not for the cost of flasks, there might be some profit in the business.

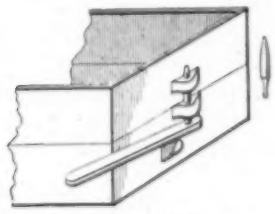


FIG. 6.—EASY REMOVAL OF TAPER SHANK PINS.

FIG. 7.—FLATTENED AND GROOVED PINS.

They admit that they are a necessity, but invariably think them an unavoidable nuisance, a source of constant annoyance, loss, and expense, and in fact the greatest evil of the foundry. It is often thought that every cent spent on the construction and maintenance of flasks is just so much money thrown into the gutter.

But, luckily, all the opinions on this subject do not run in the same direction. There are many founders who have gone through it, who hold and prove that bad flasks give bad results, are false economy, and point to poor judgment. They argue, and justly so, that money spent judiciously for a good flask equipment, especially for a good set of stock flasks, and a liberal sum set aside and used for their maintenance, is a good investment. An expenditure of this kind is mainly a matter of first cost, and is fully justified by the results.

The founder who knows a good thing when he sees it, will also know how to take care of it. He will not permit his flasks to be abused and thrown out into the yard where they are exposed to the deteriorating effects of the weather. He will keep them under roof and guard them against all possible damage. Nobody will question the fact that bad flasks are more than likely the principal cause of loss of time and of castings. Yet how many are there who will anxiously try to save and stint in this direction? Give your molder good material, good facilities, and above all let him have good flasks, and you have a right to expect a good day's work, and that of good quality.

Good flasks are especially important in machine or plate molding. In fact, to insure good results from molding machines, the flasks must be practically perfect. They should be constructed so as to insure a firm holding of the molding sand. They should be made stiff, light and durable. The flask pins should be accurately fitted. If flasks are made in sets, they must be absolutely interchangeable. When copes and drags are put together they should not rock or shake sideways. The pins should be firm and square with the flask surface; and while they must not bind on the other hand they must not fit too loosely.

Ordinary shop-made wooden flasks, such as are used in most foundries, are not likely to give good results in molding machine practice, but if carefully and substantially made, and perfect in all other respects, there is no reason why their application in machine molding should be absolutely condemned.

Iron flasks are always preferable, more especially because they do not shrink, warp, or get out of joint. Pressed steel flasks, if they could be procured, would answer still better. If wooden flasks are used, they should be provided with an iron ring, at their face, which ring should serve not only as a tie and alignment, but also as a base for securing the flask pins.

Flask Pins.

Turned tapering flask pins give the best satisfaction in flasks for machine molding. Part of the pin is usually turned down to a square shoulder with a thread at its lower end, the cylindrical portion is fitted into a corresponding hole in the flask lug and permanently secured thereto by a nut. A better way is to ream tapering holes in the flask lugs, make the lower ends of the pins accordingly and drive them lightly into place. Thus, a few pins will answer for any number of flasks, as they can be removed as soon as the flasks are closed and clamped together. Greater care can thus be bestowed upon their production, as the increased cost is but a small item, and when not in use they can be easily removed from their sockets and bolts, flasks and pins can be easily and propertly taken care of.

A convenient way is to remove such taper shank pins is shown in Fig. 6. A piece of flat iron or a flask clamp is used as a lever by placing it between the lower end of the taper shank and the rounded top edge of a fulcrum lug, which may form a part of the side of the flask, and which should be located one or two inches out of alignment with regard to the center line of the flask pin. A prolongation of these lugs may also form the handle of the flask. A slight pressure or a light tap with the hammer will loosen the pins from their sockets, whereupon they may be easily withdrawn. The B. & S. standard is recommended as the most suitable taper for those taper shank flask pins. Accurate reamers are always obtainable in exact duplicates, and their use insures absolute uniformity.

It may not be out of place to caution against the maltreatment of the ends of these flask pins, which is bound to cause trouble and annoyance. There is not much likelihood to injure the pins if mallets of either rawhide, wood, lead or copper are used for driving them in or out. As an additional precaution, to protect them from injury it is desirable to have them case-hardened. Care should be taken that the flask pins do not spring or bend during the hardening process, if they do, this fault should be corrected before they go into service, for bent or sprung pins are unfit for use. Little or no trouble will be experienced with good tool steel pins.

It is common practice to arrange the flask pin lugs in such a manner that a space of about a quarter of an inch or more is left between them when the flask is closed. Thus, no attention need be paid to the small quantity of molding sand, which inadvertently collects and packs around the base of the pins while the flask is being filled, but which would otherwise form an obstruction in the closing up of the flask. These spillings must be removed if the faces of the lugs are on a level with the parting edge of the flask.

It is sometimes troublesome to close or open flasks which are provided with well-fitting round flask pins, as molding sand or dust will unavoidably adhere to them. This difficulty may be overcome to a great extent by removing a portion of the cylindrical part of the pin by either flattening or grooving as shown in the cross section, Fig. 7.

Constant use of flasks of this kind will eventually wear out not only the flask pins, but also the sockets of their corresponding mates. They cannot possibly be kept absolutely clean, and the sand will keep on cutting until the defect must be remedied. It is an easy matter to exchange the worn out pin for a new one, but it is not so easy to correct the fault in the flask pin socket, unless, indeed, it was provided with a removable bushing in the first place. This, when necessary, can be replaced with the same facility as the pin. This is a point but rarely observed. To get perfectly satisfactory service out of a flask, it is nevertheless quite as important a matter as all the others which were mentioned above.

The makers of molding machines are undoubtedly very well

aware of all the requirements, which are covered by the observance of these little details; they will appreciate their importance and must admit that they are essential to make their machines a success. Yet, to my knowledge these facts have never been mentioned. Is this information kept from the founder purposely, that he may not be scared from the purchase of machines? If he should be told all this he might in the first place think of the expense, and next that his molders cannot get used to refinements of this kind—which, by the way, is not a very creditable opinion. But, if he buys one or more of the machines offered he cannot help finding all this out before long, to his own chagrin. By that time, perhaps, he has made up his mind to throw the thing in the scrap pile, or, if he persists, because he knows that others have succeeded, he will be compelled to pay dearly for his experience. He could have had this experience in the first place, and at a reasonable price, had he been furnished not only with the machine, but at the same time with jigs, sample flasks, pins, etc., and above all with necessary information to which he was justly entitled.

It should be taken into consideration, that not all founders, foremen and molders are expert engineers or machinists, nor can they be expected to be fully versed in all the intricacies of machine design, mechanical laws and movements. To convince them, and to demonstrate that machine molding is superior in every respect and more economical than the process of hand molding, in which line they themselves are experts, they need all available assistance and must be taught from the very beginning the principles of the construction of the machines, the scope of their utility, their application and the importance of accessories, and the essential parts in all minor details. Many failures to introduce the molding machine into foundries, to establish and to maintain their reputation as labor savers can be traced to the lack of intelligible instructions sent with them by their makers, and be it intention or neglect, the withholding of this information does more or less harm to all parties interested, and retards the world's industrial progress.

Wages Advanced by Illinois Steel Co.

Regarding the published reports of a 10 percent advance in wages to be granted the employes of the Illinois Steel Co., E. J. Buffington, president of the Illinois Steel Co., speaks as follows: "Notices from Joliet to the effect that employes of the Illinois Steel Co. will receive an advance of 10 percent in wages, effective on June 15, are incorrect. Some time ago we decided to make an adjustment in the wages of certain employes at all works, which will result in an advance in the rates now paid in many of the existing contracts with tonnage men and with men engaged on piece work, nor will such contracts be in any way affected. The adjustment involves a considerable amount of work on account of treating individually the rate of each employe to be affected, and for this reason it is impossible to state the amount or rate of increase in the wages paid. It was hoped that the adjustment could be arranged so as to make announcement of it by June 1, but the work involved made this impossible: however, the adjustment will be made effective as of that date, so that those who are to receive an advance will be benefited to the same extent as if the announcement had been made on June 1. This adjustment is made voluntarily and in recognition of the advanced cost of living."

The cost of United States battleships per ton, of hull, machinery and fittings, but exclusive of armor and armament, ranges from $385 in 1896 to $656 in 1890, according to a late report to the House Naval Committee made by Rear Admiral F. T. Bowles, chief constructor, U. S. N. The report says that the $385 for the Kearsarge and Kentucky certainly included no profit to the contractors, and Admiral Bowles believes that the contract prices of $401 to $406 per ton for the last four battleships—the Missouri, Ohio, Virginia and Pennsylvania—contracted for 1898-1901, do not include unreasonable profits. He admits that the building of the earlier battleships probably netted a considerable profit to the builders.

The David Bradley Mfg. Co., Bradley, Ill., has awarded a contract for a three-story building, 80x200 feet. The estimated cost is $35,000.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of Their Wants:—

The expanding business of the Richmond Stove Co., of Norwich, Conn., has necessitated the reorganization of the company with a capital of $500,000. The new name is the Richmond Company and the directors and officers are the same. The company has just completed an addition to its foundry and will construct a new foundry building.

The Colonial Foundry Co., of Norwalk, Conn., has been incorporated with $100,000 capital.

The Hyle Bros.' Steel Co., Syracuse, N. Y., is negotiating for the purchase of a 10-acre tract of land upon which it will erect a large plant for the manufacture of dies, taps, pipe cutters, tube expanders and other tools requiring a high grade of steel.

The Automatic Boiler Cleaner Co. has been organized at Pierre, S. D., with $100,000 capital by E. Lind, S. W. McColom and T. P. Estes. The company will manufacture an automatic boiler cleaner.

The E. C. Fuller Co., of New York, has been incorporated with $500,000 capital to manufacture machinery. E. C. Fuller, E. E. Bush and G. W. Pardee are the incorporators.

It is reported that George D. Evans, formerly manager of the Carnahan Tin Plate Co., Canton, O., is promoting a company to have a capital of $200,000 to erect a large sheet mill.

The Benedict & Burnham Brass & Copper Co., Chicago, has increased the capital stock from $100,000 to $150,000.

The Dellenbach Gas Engine Co., Pittsburg, has been incorporated with a capital stock of $1,600.

The Klipfelt & Thomas Co., Chicago, has been incorporated by Richard E. Thomas, William D. Klipfelt and Frank J. Klipfelt, with a capital stock of $10,000 to manufacture, buy, sell and exchange machinery.

The Grafton Foundry & Machine Co., Grafton, W. Va., has been incorporated with a capital stock of $25,000. The incorporators are B. F. Bailey, H. M. Leps, C. R. Durbin, W. H. Bailey and G. H. Kunst, all of Grafton.

Fires and Accidents:—

The Royer Wheel Works, at Aurora, Ind., were burned June 20. Loss, $75,000.

A fire that started in the Phenix Iron Works, Portland, Ore., destroyed six blocks of buildings valued at $600,000. Insurance, $200,000. The loss of the Phenix company was $80,000 with $45,000 insurance. In the Johnston shipyard, where a lot of valuable machinery was destroyed, the loss was $75,000 with $40,000 insurance.

The foundry and pattern shop of the Diamond Drill & Machine Co., Birdsboro, Pa., were destroyed by fire on June 18.

The works of the Meyer Furnace Co., Peoria, Ill., were destroyed by fire last week entailing a loss of $10,000.

The Hoffman Hinge & Foundry Co., Cleveland, sustained a loss of $10,000 by fire which started in the tempering and japanning department. The main building narrowly escaped. The loss is covered by insurance.

New Construction:—

The Detroit Iron & Steel Co. has let some of the construction contracts for its new furnace, to be erected on Zug Island, below Detroit. Wm. Tod & Co., of Youngstown, O., will furnish the blowing engines—two high pressure and an intermediate low pressure, which can be coupled to either of the others. Cylinders are 84 inches diameter, with 5 foot stroke. The Riter-Conley Mfg. Co., of Pittsburg, has the contract for the iron work on the stack and stoves. The furnace will be 78 x 17½ feet; the stoves, 83 x 20 feet. There will be eight Cahall boilers of the B. & W. type, 264 h. p. each. The structural work, trestles, bins, etc., will be done by the Russel Wheel & Foundry Co., of Detroit. There will be a double skip furnace hoist. Coke will be handled from bins. The ore handling equipment has not been fully decided.

The Drop Forge Machine Co., recently organized at Ensley, Ala., has decided to erect its plant a short distance from

Ensley where a site was donated. The erection of the buildings will be commenced immediately.

The National Rolling Mill, Hartford, Conn., will install two gas producers.

At the annual meeting of the Rome Locomotive Works, Rome, N. Y., it was decided to considerably increase the output of the plant by the erection of a large addition. H. Monkhouse was elected president; H. D. Cooke, vice-president; W. L. B. Hammon, secretary, and A. T. White, treasurer.

The Fairbanks, Morse Co., will erect a $12,500 foundry at Beloit, Wis.

It is reported that the Waukesha Sheet Steel Co., Waukesha, Wis., is contemplating the erection of a corrugating plant and it is probable that several open-hearth furnaces will be added.

The Tacoma Brass & Machine Co. is erecting a new shop at Seattle, Wash. It will be 60x60 feet, two stories high and equipped with a traveling crane and up-to-date machinery.

The Colonial Foundry & Machinery Co., of Norwalk, Conn., which has just been incorporated with a capital of $100,000, has absorbed the Norwalk Pattern Works, of East Norwalk, and the L. J. Wing Mfg. Co., of New York, and will transfer the plant of the latter company to East Norwalk. A new machine shop will be built and the foundry will be enlarged.

The Tacoma (Wash.) Steel Co. has purchased 1,760 acres of mineral land on Vancouver Island. President Henry Hewitt says the first move will be the erection of a 150-ton furnace in Tacoma. The ore bodies are of great extent, immense outcrops of ore showing in many places, sometimes for 150 feet in extent.

A large addition is to be built by the Waterbury Brass Co., Waterbury, Conn. The building will be 150x200 feet.

The Stanley Works Co., of New Britain, Conn., makers of bulb hinges and bolts, will erect six new factory buildings.

The Wheelock & Lovejoy Steel Co., of England, contemplates erecting a plant at Bridgeport, Conn., for the manufacture of steel tools and cutlery.

Ground has been broken for the plant of the American Tube & Stamping Co., to be erected in Bridgeport, Conn., at a cost of $100,000.

The plans for the works of the International Steam Pump Co., at Harrison, near Newark, N. J., show that the plant will occupy 30 acres of land and cost $1,000,000. About 4,000 men will be employed.

The main building of the Howery Mfg. Co., at Chester, Pa., will be 544x106 feet. There will two air furnaces, one of 20 tons and the other of 40 tons. About 250 men will be employed.

Several new buildings are to be erected by the Walsh & Weidner Boiler Works, Chattanooga, Tenn. Bids are being received.

An addition 45x75 feet will be built by Clark's Iron Foundry, Philadelphia.

A new plant will be erected soon by the Cayute Wheel & Foundry Co., Sayre, Pa.

Two additions to its plant will be erected by the Mechanics Foundry & Machine Co., Fall River, Mass.

The new car shop for the Northern Pacific Ry. Co., at Missoula, Montana, will be of brick, 100x250 feet. Hastie & Dougan, Spokane, Wash., have been awarded the contract.

N. A. Watson, of Erie, Pa., is erecting a two-story brick at 21st and State Sts., made necessary by the increase of his injector and button business.

The new boiler shops of the Phœnix Iron Works, Meadville, Pa., will be finished about July 25.

Contracts have been awarded for additions to the plant of the New Britain (Conn.) Machine Co. A four-story brick building, 57x130 feet, and a one-story engine building, 16x60 feet, will be erected.

The National Malleable Casting Co., Cleveland, will erect an $18,000 office building near its East Madison Ave. shop.

The Standard Tool Co., Cleveland, will add a new factory building, three stories high, to its Central Ave. plant. Estimated cost, $10,000.

The Born Steel Range Co., Cleveland, has purchased three and three-quarters acres of land adjacent to the present property and will erect a new one-story building, 500x120 feet.

The Lumen Bearing Co., Buffalo, has had plans prepared for a new brick building, 70x190 feet, to be erected in the rear of the old plant.

Edged tools are to be manufactured by the Dudley Shuttle Co. at the works at Wilkinsonville, Mass., and the business of the concern greatly increased.

The United States Steel Co. is building a new office, machine shop and an addition to the power house at Everett, Mass.

The Pennsylvania Railroad Co. will soon receive bids for the erection of a new shop building at Ft. Wayne, Ind. It will be of brick, 600x80 feet.

The Inter-State Foundry Co., Cleveland, will erect a one-story addition to their foundry, 130x200 feet.

Within two weeks ground will be broken at Trenton, N. J., for a plant to be erected at a cost of $1,000,000 by the Jordan L. Mott Iron Works. Options have been obtained on about 20 acres in Trenton. Nearly 5,000 men will be employed by the company.

The George W. Heartley Machine Co., Toledo, O., has awarded the contract for its new building. The old Ketcham buliding will be remodeled and both buildings will be occupied by the company.

The Pittsburg District:—

The Federal Machinery Co., Allegheny, Pa., recently incorporated by J. C. Beisel, E. L. Kidney and D. G. Knittel, of Allegheny, Pa., will erect a $4,000 machine shop for the manufacture of light machine tools.

According to present indications the new tube plant of the National Tube Co. will be located at McKeesport, despite reports to the contrary. The options on the property secured by the company some time ago are now being taken up by a citizens' committee at much lower figures and when all the options have been secured they will be turned over to the National Tube Co. If the price of the land is low enough the plant will certainly be built in the Tube City. It is stated that the present options are at figures fully 50 percent lower than those held by the National Tube Co.

The Pittsburg Association of the Pattern Makers' League will decide this week whether it will demand an increase in wages from $3.50 to $3.75 per day. The machinists in the Pittsburg district were refused a uniform advance of 10 percent and a nine-hour day although it is probable that the manufacturers will make some concessions to be decided upon at a conference to be held shortly.

The recently incorporated Railway Steel Casting Co., of Pittsburg, which expected to erect its plant at Tarentum, Pa., has decided not to locate on this site. A large tract of land is now being negotiated for near New Castle, Pa.

The Pittsburg Construction Co., Pittsburg, has been awarded the contract for the erection of a portion of the steel buildings to be added to the freight yards of the Pennsylvania Railroad at Columbus, O. A new roundhouse, repair shop, power house and erecting shop will be built.

The Oil Well Supply Co., Pittsburg, closed an order this week for 7 miles of water pipe to be shipped to Cape Nome, Alaska, the contract calling for about 1,800 tons of material. Another contract calls for all the piping required to equip a new water works for the town of Addison, W. Va.

James McCutcheon, John M. Kennedy and J. B. Orr have been appointed liquidating trustees of the Keystone Rolling Mill Co., Ltd., Pittsburg, dissolved by mutual consent. The plant was sold nine months ago to the Fort Pitt Iron & Steel Co., of Pittsburg, and is being operated in the manufacture of muck bars and iron skelp.

A contract for a basic open-hearth plant for the C. Pardee Works, Perth Amboy, N. J., has been awarded the Foster-Miller Engineering Co., Pittsburg. The furnaces will be of 30 tons capacity each. The Foster-Miller Co. have also obtained a contract from the Latrobe Steel Co., Latrobe, Pa., to change all its gas producers to water sealed type.

The Burns Uniform Steel & Metallic Co. have purchased 40 acres of land near Latrobe and commenced the erection of a plant. A frame sheeted building will cost $9,200 and the Foster-Miller Engineering Co. has a contract for constructing furnaces at a cost of $62,000. The entire plant will cost $200,000. Negotiations are pending for the consolidation of this company with three independent steel companies having

a paid up capital of $500,000 each, but General Manager Burns says that he is not yet able to made a statement for publication.

The Empire Chain Co., Pittsburg, began to make chain June 16. The capital has been increased from $1,000 to $10,000.

The Westinghouse Electric & Mfg. Co. has been awarded by Chas. T. Yerkes the contract for installation of the great power house for the Metropolitan District Railway at Chelsea, London, at a cost of $5,000,000. The plant, which will be the largest in England, will be completed within one year. James Stewart & Co., Pittsburg contractors, captured the contract for the Westinghouse company. The high price of steel in the United States and the inability of the mills to give early delivery, coupled with the fact that England has for some time been sending steel to this country, gave the British builders the hope that they could capture the work. James C. Stewart hurried to Essen and Oberhausen and obtained options on 10,000 to 12,000 tons of steel needed, one of those giving an option being Krupp. Comparatively early delivery was assured.

The engineering department of the Pittsburgh Gage & Supply Co., Pittsburg, has secured through Victor Beutner, engineer, Westinghouse Building, Pittsburg, the order for one pair of 600-h. p. Brown Corliss Engine Co. (Corliss, Wis.) twin engines to drive direct connected electric generators at 136 r. p. m. in the new mill of the Susquehanna Iron & Steel Co., Lancaster, Pa. It has also secured an order from the Hoover, Owens & Rentschler Co., Hamilton, O., for supplying two cross-compound engines of their manufacture with a White Star filtering system. These engines are destined for the power plant of the Cincinnati, Georgetown & Portsmouth Railway Co.

The Riter-Conley Mfg. Co. has been awarded contracts for the erection of Carrie furnace No. 5 by the Carnegie Steel Co. The new furnace will be 90 feet high with a 20-foot bosh and will have a daily output of 600 tons. The contract also includes an extension of the ore bins and handling equipment generally in use at the other four furnaces. The Riter- Conley Co. will also erect a plant at Leetsdale, Pa., for the erection of sea going barges and tank steamers, a contract for an oil barge having already been received. Heretofore these barges have been built entirely of wood and the new departure will mean the consumption of a large amount of steel.

General Industrial Notes:—

Extensive improvements are being made at the Superior, Wis., shipyards. The cost will be about $75,000.

The Jones National Fence Co., Columbus, O., has completed an enlargement of its plant, nearly doubling its capacity.

At the first annual meeting of the stockholders of the Kokomo Steel & Wire Co., Kokomo, Ind., the following officers were elected: President, A. A. Charles; vice president, Richard Ruddell; secretary, J. E. Fredrick; treasurer, Harry Ward. The directors of the company are as follows: Richard Ruddell, A. A. Charles, J. A. Krautz, G. W. Charles, A. V. Conradt, J. E. Fredrick, Harry Ward, J. O. Henderson and F. E. Wickenhiser. The new plant of the company, which will be finished in about 60 days, will cost $2,000,000.

The Atlantic furnace at New Castle, Pa., of the Republic Iron & Steel Co. was blown in June 7 after having been relined. An explosion the same day did considerable damage, but temporary repairs were made, and the furnace was started within 30 hours.

The Grant Tool Co., of Franklin, Pa., has just received an order from the Allis-Chalmers Co. for the new plant at West Allis, for a 24-foot pit lathe which will weigh 80,000 pounds.

The Anderson Foundry & Machine Co., Anderson, Ind., has been awarded the contract for the erection of the machinery to be installed in the new tin plate plant at Greencastle, Ind. The contract price was $22,000.

The Rapp & Speidel Iron Works, of New York, has been forced into bankruptcy. The liabilities are $114,171.54 and the assets $57,027.09. To the Phœnix Iron Co., $10,702 is due, secured by liens. It has also an unsecured claim of $10,092. The Union Foundry Co. is a creditor for $5,582 and Jones & Laughlins for $6,235.

The plant of the Portsmouth Steel Co., Portsmouth, O., is again in partial operation. The first heat was made in one of the open-hearth furnaces last week and the others will soon be placed in operation. Many improvements have been made at the plant recently and it is probable that several open-hearth furnaces will be added within the next six months.

The Brass Founders' Supply Co., of Newark, N. J., which manufactures a complete line of modern brass foundry equipment, is working on an order for Berlin, Germany, comprising flasks of its improved rib, plain bevel and straight-side design. This order, which is the largest of its kind ever received from Germany, will require over three months to complete.

The Brown-Bonnell, Valley and Haselton mills of the Republic Iron & Steel Co., Youngstown, O., will suspend operations on June 28 and will not resume until July 14. The mills are to be closed for repairs despite the fact that the management would like to keep them in operation on account of the large number of orders on hand. Few if any of the plants of the United States Steel Corporation will close down during the summer, the press of business preventing such action.

The Ellwood plant of the American Tin Plate Co., Ellwood City, Pa., is being dismantled and the machinery is being removed to Monessen, Pa., where the tin mill is being greatly enlarged. For several years there have been reports that this plant was to be dismantled but only recently has the removal of the machinery been commenced. The employes are being given positions in other plants and a number have been promoted to better places. The tin plant at Irondale, O., has also been practically dismantled although considerable machinery still remains awaiting removal.

According to present indications the tin mill of the Griffiths Charcoal Iron Co., Washington, Pa., will be placed in operation on July 1. Much of the machinery is already in place while the furnaces are already being dried preparatory to giving them a trial.

The A. H. Springer Foundry Co., Terre Haute, Ind., commenced operations last week in its recently completed foundry. The first heat was successfully drawn.

The Consolidated Brake Shoe Co., Chattanooga, Tenn., has purchased the annex to the Ross-Mehan foundry and will hereafter operate the same to make brake shoes for the Southern trade. The foundry has been idle for some time on account of a strike.

At a meeting of the directors of the Chicago Pneumatic Tool Co., held in Chicago last week, two new members were added to the executive committee. The board now consists of the following gentlemen: Charles M. Schwab, C. H. Matthiessen, J. R. McGinley, J. W. Huntley, and Max Pam. E. M. Hurley's resignation was accepted and W. J. Calhoun was elected to fill the vacancy. The directors also decided to exercise the option which they hold on the British pneumatic plant and it will be purchased by an issue of $200,000 in stock.

Providing sufficient stock is purchased the Miskinnen Furnace Mfg. Co., of Newcomerstown, O., will remove its plant to Logansport, Ind.

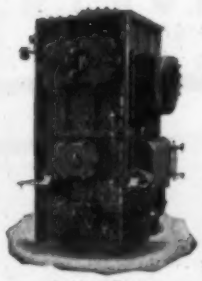
Dr. Rentzsch reports the production of coal in Germany and Luxemburg in 1901, including brown coal, as amounting to 152,628,931 metric tons, against 149,788,256 tons in 1900, and the production of iron ore as amounting to 16,570,258 tons, against 18,964,294 tons in 1900.—[Bulletin of the American Iron and Steel Association.

The Ironsides Co., Columbus, O., states that its latest acquired additional specialty, the Ironsides improved patent Tormay oiler, is being adopted by many of the principal plants of the country and that the general demand has taxed its facilities.

John D. Rockefeller and Col. Albert A. Pope are reported to be in control of the stock of the American Bicycle Co., and it is stated that Col. Pope will shortly resume active charge of the business.

The Kirk-Latty Mfg. Co., of Cleveland, announces that it has purchased the machinery, tools, manufacturing assets and good will of the Metal Goods Mfg. Co., of Cleveland, and has taken up the manufacture of its line of steel express wagons, velocipedes, wheelbarrows, etc. The Kirk-Latty Mfg. Co. has just completed very extensive additions to its manufacturing plant, more than doubling its capacity.

The contractors for erection and equipment of the new steel plant and rod and wire mills of the Colorado Fuel & Iron Co., at Pueblo, are behind on the work and it is understood that actual operations cannot begin before the late fall. All departments of the plant will not be in operation until spring.



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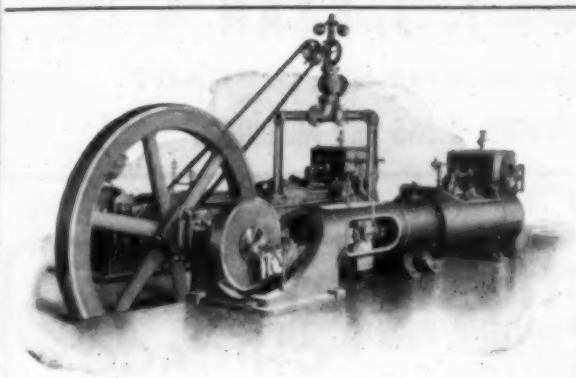

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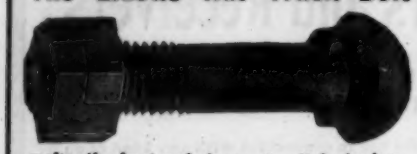

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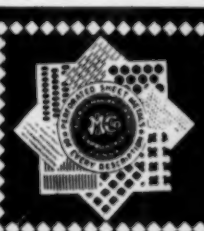

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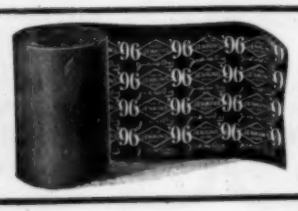

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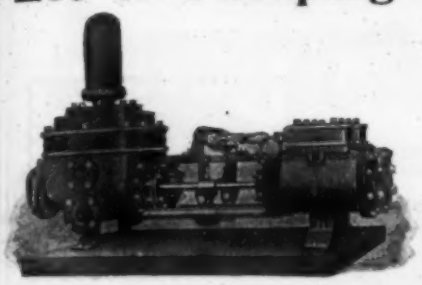

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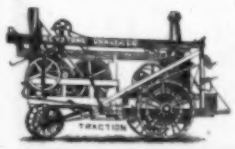

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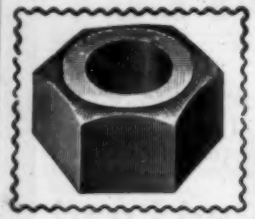

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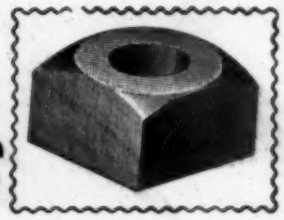

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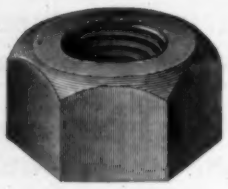

Finished, Case Hardened and Semi-finished Hexagon Nuts Threaded and Finished to Standard Gauge.

First Class in all respects.

THE UPSON NUT CO.,

CLEVELAND, OHIO.

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REPUBLIC IRON & STEEL CO., CHICAGO, ILL.

BAR IRON BAR STEEL

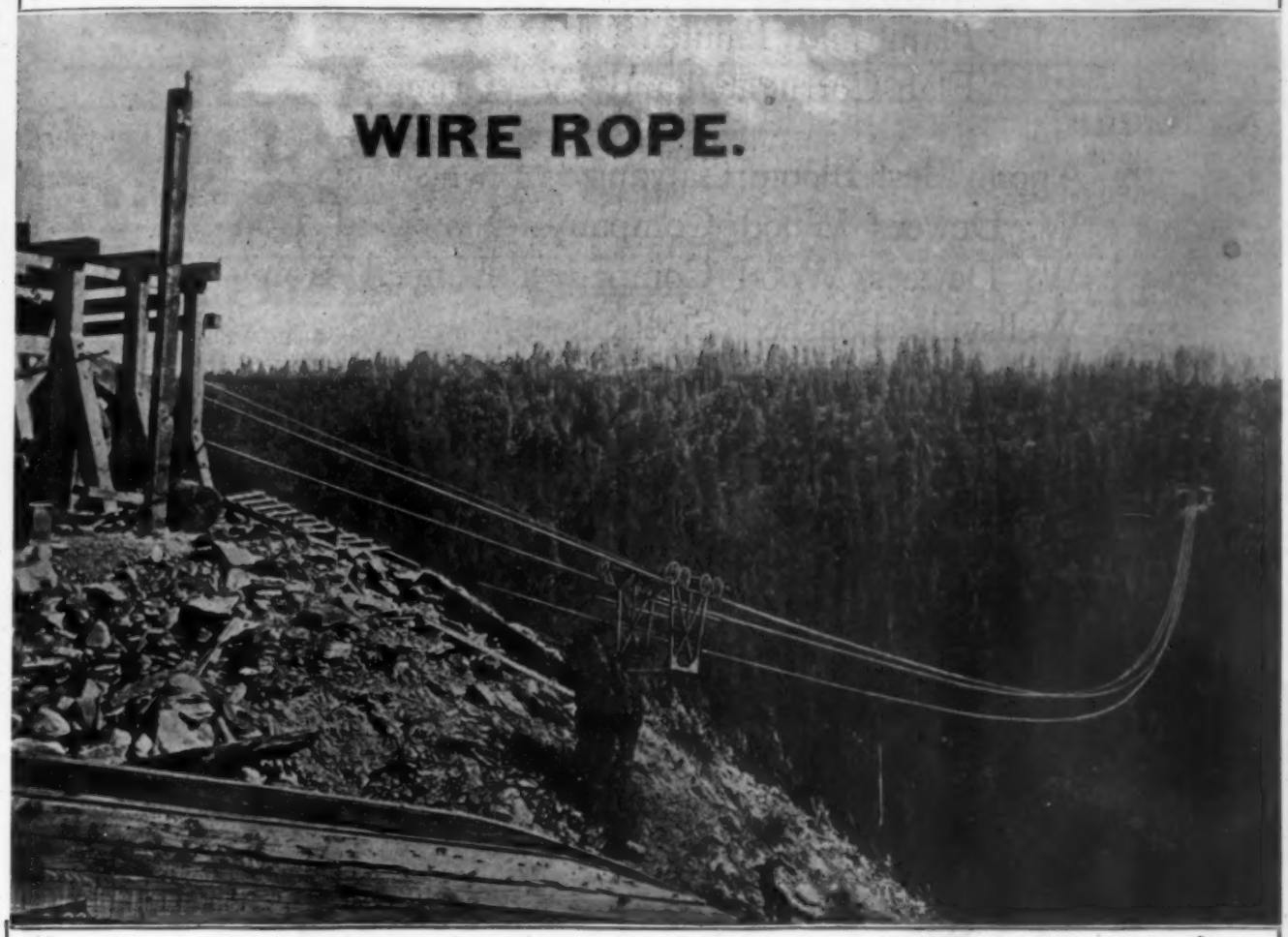
MACHINE BOLTS, CARRIAGE BOLTS, GIMLET POINT COACH SCREWS, TURNBUCKLES.

NUTS. **R. R. SPIKES.** **PIG IRON.**

NEW YORK, CLEVELAND, BIRMINGHAM, BUFFALO, CINCINNATI, ST. PAUL, SAN FRANCISCO, ST. LOUIS, BUTTE, MONT.

American Steel & Wire Co.

CHICAGO, The Rookery. NEW YORK, Empire Bldg. WORCESTER, MASS. DENVER, 809 17th St. SAN FRANCISCO, 8 and 10 Pine St.



WIRE OF EVERY DESCRIPTION, round, flat, square, triangular and odd-shaped. Barbed Wire. Music Wire. Bale Ties. Wire Rods. Wire Hoops. Mattress, Broom, Weaving and Market Wires. Special Wires adapted to all purposes.

NAILS, STAPLES, SPIKES and TACKS. Standard Wire Nails in all sizes and shapes. Miscellaneous Fine Nails. Tacks in count and weight packages. Dowel Pins.

ELECTRICAL WIRES and CABLES, bare and insulated. Telegraph and Telephone Wires.

RAIL BONDS for Electric Roads.

SPRINGS, Clock, Motor, Car, Furniture, Agricultural and all kinds of Fine and Heavy Springs.

COPPERAS and VENETIAN RED.

POULTRY NETTING, galvanized before weaving. All meshes and sizes.

HORSE SHOES, "Juniata" brand, iron or steel, in all sizes and patterns. Toe Calks.

COLD DRAWN STEEL, SHAFTING, Free Cutting Screw Steel. Roller Bearing Rods, Rounds, Squares, Hexagons, Flats and Special Shapes.

PLATES AND SHEETS of Bessemer and Open Hearth Steel.

American Sheet Steel Company

Battery Park Building New York

Manufacturers of all varieties of

IRON AND STEEL SHEETS

Black and Galvanized
Plain and Painted
Flat, Corrugated and "V" Crimped

Apollo Best Bloom Galvanized Sheets
W. Dewees Wood Company's Planished Iron
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Wellsville Polished Steel Sheets

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W. J. Wetstein & John W. Good, Security Building, St. Louis
S. J. Waterman, Union Trust Bldg., Cincinnati
Hoge & Swift, Portland, Oregon
F. A. Goodrich & Company, Chamber of Commerce, Detroit
Wm. B. Isaacs, 226 Market Street, San Francisco
B. & S. H. Thompson & Company, Montreal, Canada
T. W. Simpers, Land Title Building, Philadelphia
F. C. Milliken, Vandergrift Building, Pittsburg
S. L. Mitchel, Hennen Building, New Orleans
W. T. Shannon, 34 West Ninth Street, Chattanooga
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H. H. DICKEY, Pres. A. F. BAUMGARTEN, V. Pres. H. E. WEBER, Sec'y & Treas.

SHEETS OPEN HEARTH-BLUE ANNEALED,

GAUGES 10 TO 22, WIDTHS UP TO 48".

BLACK PLATES, HARROW DISCS, BILLETS.

FORGINGS, OPEN-HEARTH STEEL CASTINGS, BARS.

MARYLAND SHEET & STEEL CO., Cumberland, Md.

WAUKESHA SHEET STEEL COMPANY, WAUKESHA, WIS.

Manufacturers of BLACK and GALVANIZED SHEETS, PLAIN and PAINTED, FLAT and CORRUGATED.

Works and General Office, WAUKESHA, WIS.

DOES IT PAY to use coated sheets in place of black?

IT DOES if you use the ALUMINUM COATED.

Some of our customers are using it as a substitute for copper.
It can be soldered with common solder.

The Steel & Iron Aluminum Coating Co., CONNELLSVILLE, PENN'A.

STEEL CASTINGS That will Forge, Weld and Temper. Will not Crystallize.

Graphite through the metal breaks up vibration.

GRAPHITE METAL CO.,
17 Cortlandt St.,
NEW YORK, U. S. A.

"SABLE" BRAND OF SHEETS

Made from Steel and Puddled Iron. We make a specialty of Fine Steel Sheets for Corrugating, Galvanizing and Electrical Work. Also Iron Sheets from Puddled Iron.

We make **"SABLE"** Brands of Fine Forging Irons for Locomotives, Machine Shops and Mine Cars.

ZUG & COMPANY, Limited, ::: 13th & Etna Streets, Pittsburg, Pa.

A TRADE PAPER like THE IRON TRADE REVIEW is about as good an investment as any one in any branch of the Iron and Steel business can make. Why? Because it gives you information about correct prices of materials that will save you, each week, many times the cost of a year's subscription. Why not try it?

THE IRON TRADE REVIEW, Cleveland, Ohio.

This (MF) trade mark is stamped on every sheet of the best roofing tin made. This (MF) mark means "Most Favored," because this brand is most favored by architects, dealers, and builders everywhere. MF Roofing Tin was first made in Wales 50 years ago—later the process was improved in America—and the product developed, until now MF Roofing Tin is more in demand than any other brand. The superior quality of MF Roofing Tin is attested by the first prize awarded it at the Paris Exposition, 1900, where it was in competition with all the world.

MF

The entire tinning process is effected by skilled hand labor, without the use of acids or rolls. The very best plates, the greatest amount of pure tin and new lead, the utmost care in manufacture, successively contribute to making MF the best of all roofing. It is most economical, because it lasts longest—many roofs made of MF 50 years ago are sound as ever today. MF Roofing Tin is sold by dealers everywhere. Specify it in your building estimates. Ask your roofer,

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and receive illustrated book on roofing.

AMERICAN TIN PLATE COMPANY, NEW YORK.

MACHINERY BUILT ON CONTRACT OR TO ORDER.

We have a good Foundry. Machine Shop equipped with modern tools. A good Pattern Shop and Designing Department.

CHAIN MAKING MACHINERY

If you want the latest and best machinery for this class of work, we build it. We brought out this line of machinery, have kept fully posted regarding any improvement which would make it better, and our present line of Winders, Cutters and Hammers represents the best practice of today.

The Turner, Vaughn & Taylor Co.

CUYAHOGA FALLS, ... OHIO.

If you want something made let us hear from you. We can do the work and do it right. Will be pleased to answer your inquiries.

THE CUYAHOGA STEEL & WIRE COMPANY,

Office and Works: CUYAHOGA FALLS, O.

MANUFACTURERS OF

WIRE RODS.

Annealed and Galvanized Fence Wire.
Bright, Tinned and Coppered Market Wire
Tinned Mattress and Broom Wire.
Annealed Stone Wire.

Wire Straightened and Cut to Lengths.

WIRE NAILS.

THE

LORAIN STEEL COMPANY,

Lorain, Ohio.

Rails, Blooms, Billets and Slabs.

American Steel Hoop Company

GENERAL SALES OFFICES: CARNEGIE BUILDING, PITTSBURGH, PA.

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CHICAGO: The Rookery CINCINNATI: Union Trust Building CLEVELAND: Perry-Payne Building
DENVER: People's Bank Building DETROIT: Union Trust Building NEW YORK: Empire Building
PHILADELPHIA: Harrison Building SAN FRANCISCO: 258 Market Street
ST. LOUIS: Chemical Building ST. PAUL: Pioneer Press Building WASHINGTON: National Safe Deposit Building

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CITY OF MEXICO, 924 Apartado. MONTREAL, CANADA: Bell Telephone Building

M. A. Hanna & Co.,

Iron Ore, Pig Iron and Coal.

Cleveland, Ohio.

Weighed in the balance and found—wanted. What?
Inspected Foundry Iron
such as the originators and only makers make. Write or wire for prices.
CLINTON IRON & STEEL CO.
CLINTON
HECTOR

Cabeen & Co., Real Estate Trust Building, PHILADELPIA.
Steel Billets and Slabs, both Bessemer and Open Hearth, Pig Iron, Manufactured Steel, &c.

CRERAR, CLINCH & CO.,
The Rookery, CHICAGO.
Pig Iron, Iron Ore, Coal and Coke.

The Tod-Stambaugh Co., *IRON ORES.*
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J. K. DMIMICK & CO.,
Pig Iron, Steel and Coke.
1049-1051-1053 Drexel Bldg., PHILADELPHIA, PA.
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PIG IRON, IRON ORE AND FRICK COKE.
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PIG IRON, COAL & COKE.
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PIG IRON Hickman, Williams & Co.,
CHICAGO, LOUISVILLE, ST. LOUIS.

We make PIG IRON.
Foundry, Malleable, Bessemer.
LET US QUOTE YOU PRICES.
Columbus Iron & Steel Co.,
COLUMBUS, OHIO.

DRAKE, BARTOW & CO.,
IRON ORE and PIG IRON.
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SAND AND CHILL CAST
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Furnaces at SHARPSVILLE. General Offices, PITTSBURG, PA.

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STRONG FOUNDRY IRON For Quick Shipment.

Pickands, Mather & Co.,
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ALABAMA CONSOLIDATED COAL & IRON CO.,
BIRMINGHAM, ALA.
Manufacturers of the Celebrated Brands of Foundry Iron:
Clifton and Etowah.
This iron is specially adapted to thin, strong castings.
Also Miners and Shippers of HIGH GRADE STEAM COAL AND
Makers of the Well-known "STANDARD" FOUNDRY COKE.
SELLING AGENTS FOR THE NORTH AND WEST.
MATTHEW ADDY & CO., Cincinnati, Chicago, St. Louis, Pittsburg, Philadelphia, New York.
MOBILE COAL CO., Agents for Coal and Coke in Mobile territory.

JEROME KEELEY & CO.
Established 1869.
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Pig Iron, Iron Ores and Coke
Consulting Engineers in Metallurgy and Mining.
Steel and Iron Blooms, Muck Bars, etc.

Newark Iron & Steel Co., NEWARK, OHIO.

Open Hearth Steel Castings, Forge Steel, High Pressure and

LONG DISTANCE 'PHONE 358. Orders Solicited. Promptness and Reasonable Prices Our Motto.

Hydraulic Fittings, Oil Well Specialties, Castings Made True to Pattern and Uniform.

The American Iron and Steel Association has just completed a thorough revision of its well known

Directory.

The work of revision has been complicatedby the succession of changes in the iron industry, that have followed so rapidly in the past three years.

The New Directory contains about 50 pages more than its predecessor of 1898, and is a cloth-bound volume of nearly 450 well printed pages.

It gives in the first 150 pages a full list of the **consolidations and reorganizations** that have taken place in the American Iron Trade in the past three years, with a full description of all the properties taken over, with their products, names of previous owners, etc.

Then follow 164 pages giving a complete description of all the iron and steel works not in consolidations. These are arranged by states.

Part 3 gives a classification by states of the iron and steel works of the United States, except blast furnaces, according to their products—Bessemer, Open-Hearth, and Crucible Steel Works, Steel Casting Works, Rail Mills, Structural Mills, Plate, Sheet and Skelp Mills, Tin Plate Works, Cut Nail and Wire Nail Works, Wire Rod Mills.

This Directory will be found invaluable to all concerns having business with iron and steel manufacturers in any line. The price is $10, postpaid.

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THE IRON & STEEL PRESS CO., 1064 Rose Building, CLEVELAND, O.

OR THROUGH ITS OFFICES:

Room 1909, 150 Nassau St., NEW YORK.
934 Monadnock Block, CHICAGO.
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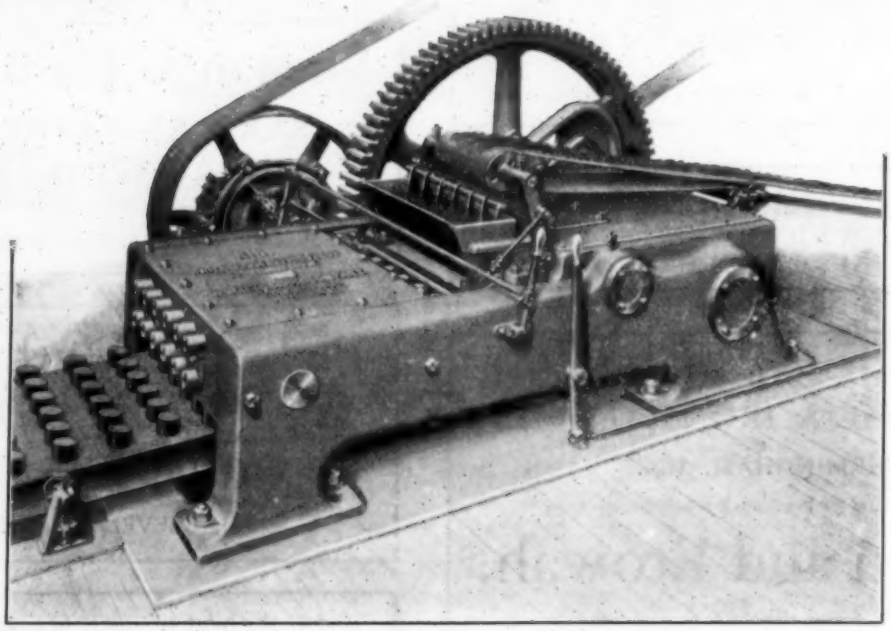
No troubles arising from use of fine ore—No flue dust waste, if Blast Furnace managers use the

WHITE BRIQUETTING PRESS.

Puts into solid block form fine ores and flue dust.

Does away with clogging and other evils.



Secures the same results as are obtainable when lump ore is used in large quantities.

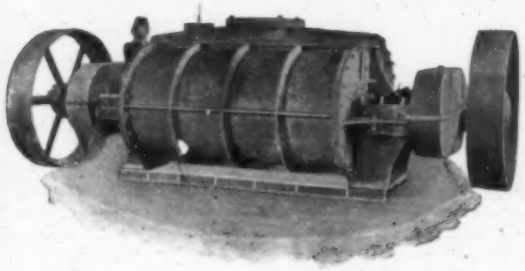
No. 1 White Briquetting Press—Built in 3 sizes. Capacity of No. 1 Press is 100 tons in 10 hours.

MANUFACTURED BY

The Henry S. Mould Company, Empire Building, PITTSBURG, PA.

For Heavy Duty

You will find no Blower as economical as the CYCLOIDAL. The owner of one of these says:



"One of your CYCLOIDAL BLOWERS has been running on 24 hours' service continuously for some months, under a pressure of 2½ pounds. It is the only blower we have ever known that can be relied upon to work night and day without giving trouble. Our order for two more CYCLOIDALS ought in itself to be considered a pretty fair recommendation."

Get a CYCLOIDAL and you will avoid trouble and worry.

The Connersville Blower Co.,

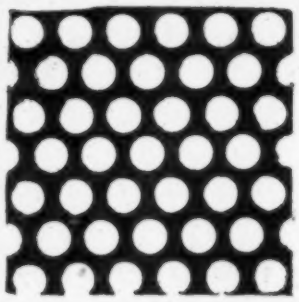
Connersville, Indiana.

Patterns for Castings.

Being thoroughly equipped and employing the latest and most approved methods, we are in a position to turn out large contract work in the least possible time. The early completion of your patterns means profit to you. The sooner they are in your possession the quicker their reproductions may be put in use or offered to the trade. Your business demands prompt service. Our business assures you of exceptional service. ∴

The Balkwill Pattern Works,

970 Hamilton St., CLEVELAND, OHIO.



Perforated METALS FOR Brick, Clay and Cement Machinery.

THE ROBERT AITCHISON PERFORATED METAL CO.,

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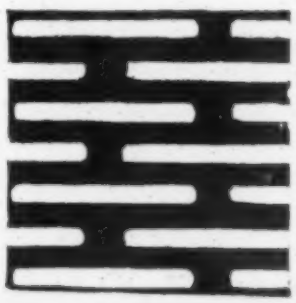
"AITCHISON MAKES 600 VARIETIES"



CARBO-MANGAN

—"a steel refiner and carbonizer, not a tempering compound."

ON TOOLS

This is especially valuable for drills, picks and stone cutters' tools, as well as all cutting tools. On taps and shell reamers its effect is particularly noticeable, obviating shrinkage.

On Cast Steel

when great tensile strength is required the use of CARBO-MANGAN will show an average gain of 25 per cent. Evaporation slight, Compound good until used, making cost light; full instructions with each order. We guarantee all we claim.

Try a 10-pound sample can, which is sufficient for small test.

☞ Booklet on Application. ☜

THE CARBO-MANGAN CO.,

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Corner in our Roll Department.

ROLLS

SAND, CHILLED, STEEL. CORLISS ENGINES. BLOWING ENGINES. ROLLING MILL MACHINERY. MACHINE MOLDED GEARS. STEEL CASTINGS.

MESTA MACHINE CO.,
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MOST ANY KIND OF CASTINGS

Outside of bench work or stove plate, comes within our line. The largere the casting the better we like it.

We use AIR FURNACE METAL for castings requiring special qualities.

Sand Rolls, Ordnance and Machinery Castings, Ingot Molds and Castings for Chemical Works is a class of work in which we are leaders.

It Pays to Buy the Best in Steel Sheets.

That's what you get if you contract with us. GAUGES 16 to 30.

The Niles Iron & Sheet Co.,
Niles, Ohio.

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CUMBERLAND, MD.

Tin Plate Works,
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MANUFACTURERS OF

TIN PLATES of Every Description.

Open Hearth Soft Steel Sheets
For Deep Stamping.

PLATE IRON AND STEEL.